2.8
96

PAPER TRADE JOURNAL

VOL. 123, NO. 18 OCTOBER 31, 1946

ECONOMY of operation—

Farsighted operators in all fields continue to scrutinize money value and efficiency toward the day when the markets change from "Seller's" to "Buyer's".

To those farsighted operators Geigy suggests

Metanil Yellow V S Conc.

for boxboard, wrapping and groundwood specialties when good fastness to alkali and fair fastness to light are desired.

Metanil Yellow V S Conc. assures Economy of Operation in the beater or at the calender.

GEIGY COMPANY, INC.

89-91 BARCLAY STREET NEW YORK-8, NEW YORK

Boston Providence
Philadelphia Charlotte
Toronto Portland, Ore.
Chicago

Geigy
Dyestuff Makers Since 1859

In Great Britain
The Geigy Co., Ltd.
National Buildings
Parsonage, Manchester

LIBRARY RECEIVED JUL 13 1955 U.S. DEPARTMENT OF AGRICULTURE

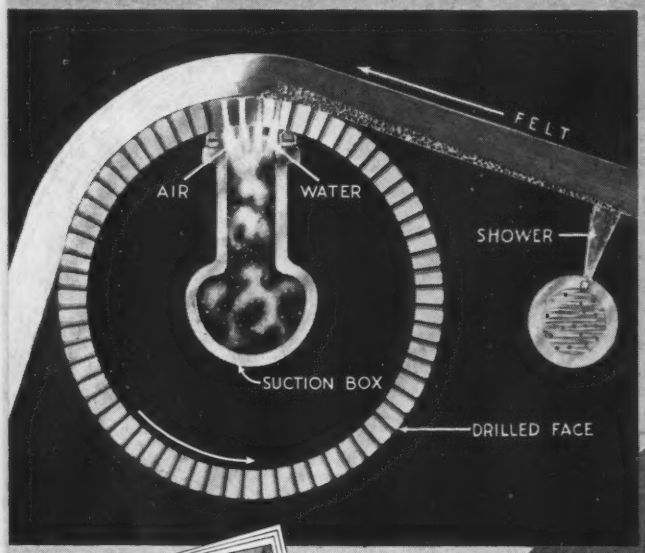
Deferiet Mill Capacity Is Raised 37½ Per Cent
Marathon Names Three to Higher Sales Posts
Baum Interests Buy Hinsdale Group

Curtain Hides Details of Ontario Woods Strike
Wisconsin Studies Fox-Wolf River Control
Mando Net Rises for Three Quarters

SEE THE "Straight Line" OF FELT CLEANING IN THE PHOTOGRAPH AT LOWER RIGHT

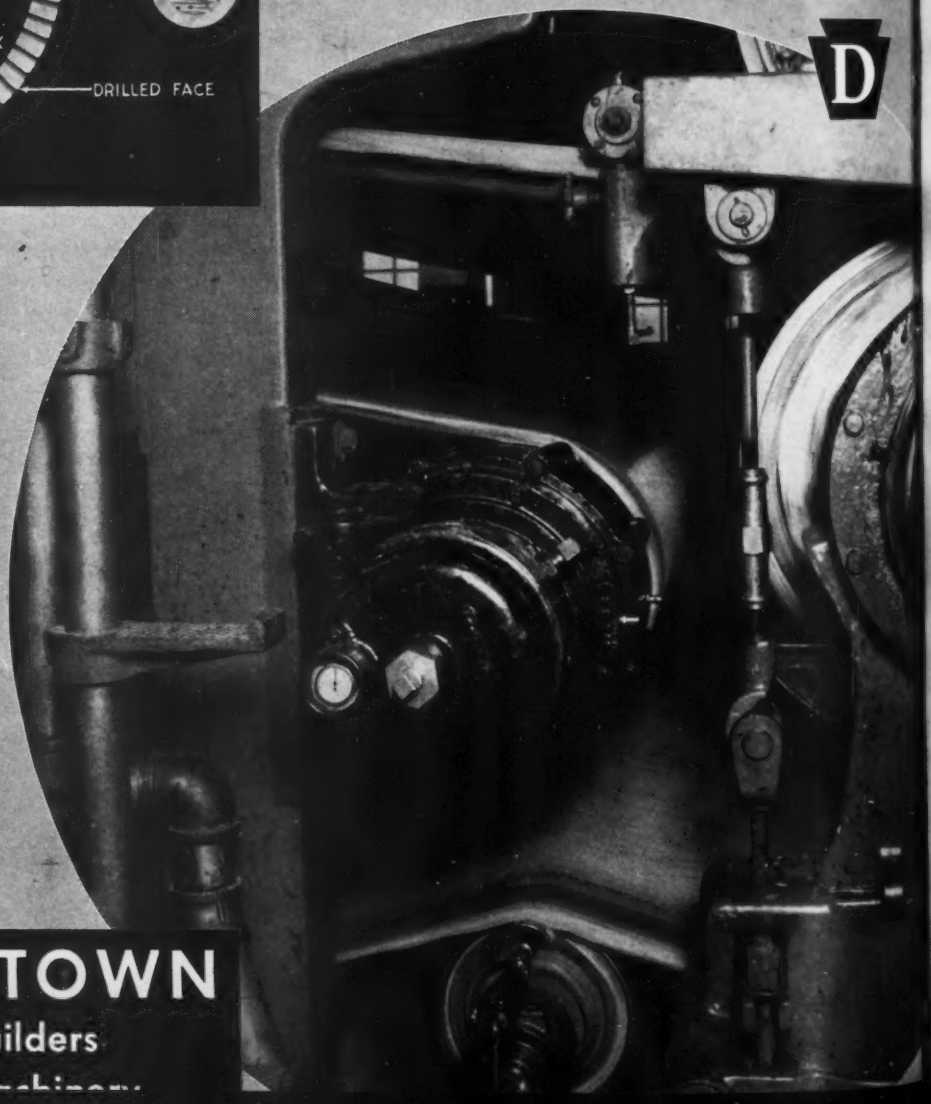
The sharp, distinct change of felt color from dark to light gray in the photo shows the cleaning and conditioning action of the Downingtown Suction Felt Roll. This is straight-across-the-felt-action which you have continuously and with safety. Sectional drawing shows how the roll is installed. It requires no drive; travel of the felt turns the roll, which is mounted in anti-friction bearings. Takes only about one-tenth the power consumed by drag of flat boxes. Over 200 now in use.

DOWNINGTOWN MFG. CO.
DOWNINGTOWN, PA.

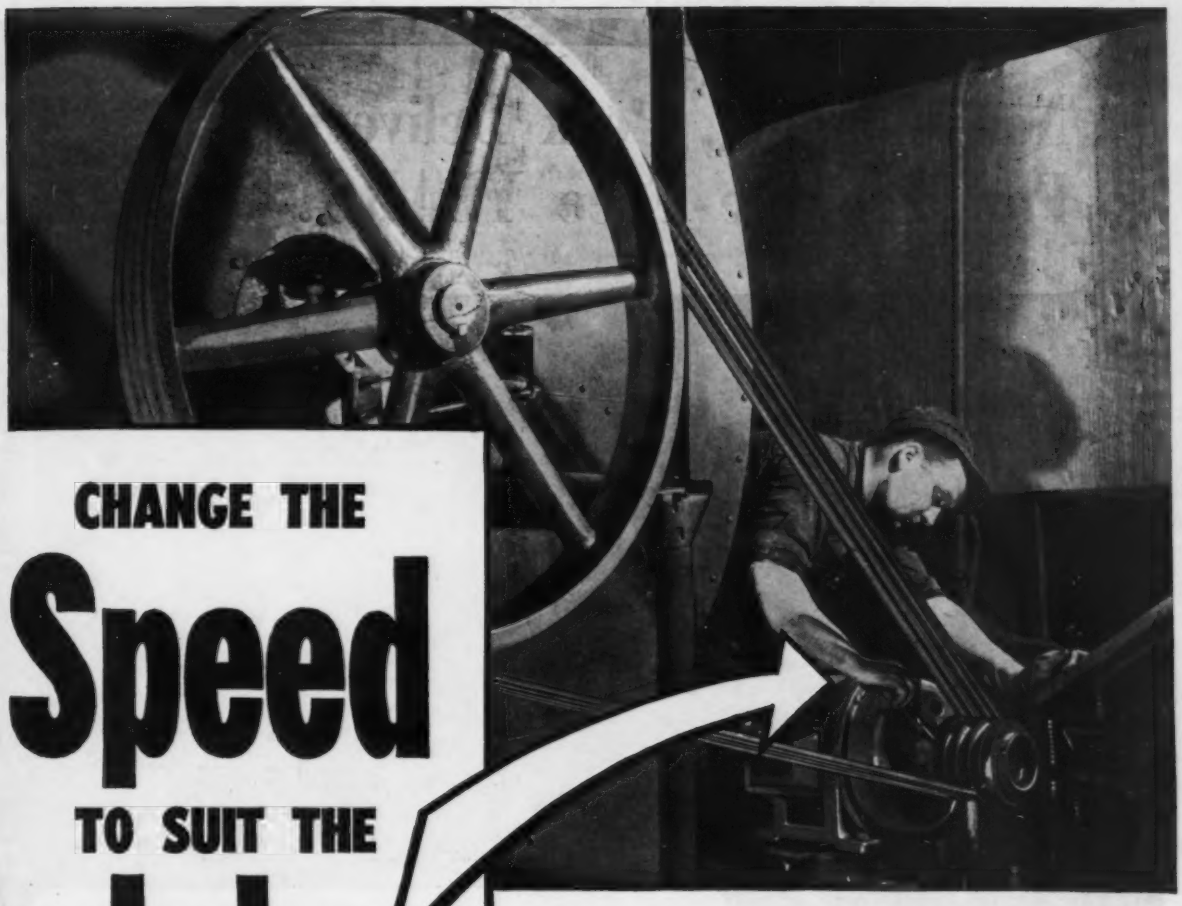


New Catalog
Write for it today

Installation on a 214 inch fourdrinier making machine for coated papers.



DOWNINGTOWN
Designers & Builders
Paper Making Machinery



CHANGE THE Speed TO SUIT THE Job..

Texrope Vari-Pitch sheave makes it possible to vary the speed of this ventilating blower up to 25% to meet seasonal changes. Speed adjustment is quickly and easily made. A2102

Economical...TEXROPE Variable Speed Drives!

Whenever variations in speed will add to efficiency, production or economy — use TEXROPE Variable speed drives with standard constant speed motors. A Vari-Pitch sheave may provide all the speed range needed. They're available for stationary or motion control. Wide-Range Vari-Pitch sheaves and V-Belts provide greater range up to 116% — Speed Changers up to 375%.

A Complete Line . . .

Sheaves, Speed Changers . . . V-Belts . . . Engineering Aid. Your nearest Allis-Chalmers office or dealer is headquarters for EVERY type of V-Belt Drive equipment. Save time by buying all your needs from one reliable source. Every item of equipment is designed and backed by Allis-Chalmers — originators of industry's Multiple V-Belt Drive. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

"Magic-Grip" Sheaves are Faster ON . . . Faster OFF

Here's the sheave that requires no filing, reaming or hammering to mount — no wheel-puller or bulging muscles to demount. *It comes completely assembled.* Just slide it on the shaft and tighten three cap screws. That's all! Grips like a vise — no shear, wobble or backlash. No damage to shaft or motor bearings.

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products

TEXROPE V-BELT DRIVES

Non-Clogging, Peak Delivery For Trouble-Free YEARS!

"Buffalo" PAPER STOCK PUMPS *Cut Your Costs!*

Handling varying consistencies and heads without clogging or overloading . . . yet doing it year after year with the same high delivery and low power consumption as the day you installed them . . . that's the cost-reducing job "Buffalo" Paper Stock Pumps can do for you!

And trained "Buffalo" representatives can advise you accurately and without bias as to the *right* capacity and design, for "Buffalo" Pumps cover the range of every paper application. Buffalo builds single suction solid and split shell pumps as well as double suction pumps for all kinds of paper stocks, for liquors and clear water.

For complete data on these pumps that cut maintenance to a minimum, write today for Bulletin 953-F.

BUFFALO PUMPS, INC.
159 Mortimer St., Buffalo, N. Y.
Canada Pumps, Ltd., Kitchener, Ont.

"Buffalo" PAPER STOCK PUMPS

PAPER TRADE JOURNAL

Title Reg. U. S. Pat. Off.
Established 1872

Volume 123 Number 18

Published Every Thursday by Lockwood Trade Journal Co., Inc.

Executive and Editorial Offices:
15 W. 47th St., New York 19, New York

GEO. E. LOCKWOOD, *President & Treasurer*
ARTHUR E. GORDON, *Vice-President*
JOSEPH P. HORGAN, *Secretary*
W. L. COOK, *Editor*
HARRY I. JENSEN, *Assistant Editor*
R. G. MACDONALD, *"TAPPI" Editor*
F. B. GROSSE, *Make-Up Editor*

Eastern Representatives
BRUCE E. BROWN, *15 W. 47 St., New York 19 N. Y.*
EDWARD H. DOERING, *15 W. 47th St., New York 19, N. Y.*

Mid-Western Representative
H. K. VINTON, *123 W. Madison St., Chicago 2, Ill.*

Pacific Coast Representatives
ROY M. MCDONALD & Co.,
San Francisco, 4, Cal., 564 Market St.
Los Angeles, 6, Cal., 1323 Venice Blvd.
Seattle, 1, Wash., 1411 Fourth Ave.

Representative for Denmark, Norway, Sweden and Finland
OXFORD TRADING AKTIEBOLAGET, *Bibliotekgatan 6-8, Stockholm, Sweden.*

Subscriptions: (Payable in advance) By the year $4.00; Single Copy 10 cents.
Postage Extra: To Canada $2.00; To Other Foreign Countries $3.50.

Member Audit Bureau of Circulations.

PAPER established Feb. 17, 1899, combined with PAPER TRADE JOURNAL Nov. 16, 1899, PAPER established Sept. 21, 1910, combined with PAPER TRADE JOURNAL Feb. 19, 1926. All rights to the above titles reserved.

PAPER TRADE JOURNAL is entered as Second Class matter at the Post Office at East Stroudsburg, Pa., under Act of Congress of March 3, 1879. Publication Office at Lockwood Trade Journal Co., Inc., 34 N. Crystal St., East Stroudsburg, Pa. Printed in U. S. A.

Copyright 1946 by the Lockwood Trade Journal Company, Inc. The contents of PAPER TRADE JOURNAL including all articles, illustrations, etc., are covered by copyright and may not be reprinted except by permission.

CONTENTS

OCTOBER 31, 1946

Iron Curtain Hides Effect of Northwoods Timber Strike	7
Baum Interests Buy Hinsdale Mill Group	8
Deferiet Output is Lifted 37½ Per Cent	8
Tissue Men Meet at Shawnee	10
Control Removed from Sensitized Paper	10
Creditors to Name Norwood Trustee	14
Australia Takes Count of Its Pulp and Paper Industry	21
Obituary	21
Instrumentation Studies LV	24

Financial News	18	Production Report	31
Market Review	46	Miscellaneous Markets	47
Imports	45	Market Quotations	47
Editorial	30	Classified Advertising	50

Technical Section *("TAPPI")*

Collector for Sulphate Soap	33
Comparative Estimations of Carbonyl and Carboxyl Groups in Chromium Trioxide and Hypochlorous Acid Oxycelluloses and Oxyxylans	35
New TAPPI Members	42
Flax Straw Procurement	43
TAPPI Notes	44

PAPER TRADE JOURNAL IS INDEXED IN INDUSTRIAL ARTS INDEX

INDEX TO ADVERTISERS ON PAGE 64

SPRACO NOZZLES

Write for NOZZLE CATALOG

MANUFACTURED BY SPRAY ENGINEERING CO.
118 CENTRAL STREET, SOMERVILLE 45, MASS.

Converts

CORN STARCH

INTO THE MOST ECONOMICAL TUB SIZING, CALENDER SIZING AND LAMINATING ADHESIVES

R. T. VANDERBILT CO., INC.

230 Park Avenue, New York City

PAPER TRADE JOURNAL
Vol. 123, No. 18 October 31, 1946
Title Reg. U. S. Pat. Off.

Fox-Wolf River Control Is Studied

SHIOCTON, Wis. — The old problem of a control project for the control of the Fox and Wolf rivers was discussed at the farm home of Ralph Gehring, near here, on October 24, at a meeting of United States Army engineers, congressmen from this area, and directors of the Fox and Wolf River Control Association, of which Mr. Gehring is president.

The position taken by the engineers, in general, is that this control problem is an old one; that district engineers in 1922 submitted a report recommending a system of levees on the upper Fox and Wolf rivers and their tributaries to control floods, and that this report was approved by the Board of Army Engineers but that no congressional action has been taken. The report needs to be brought up to date but the engineers do not believe the proposed reservoir system would be feasible.

The control association, on the other hand, believes that a new field study is necessary, and that a new report to Washington should take into consideration other factors than flood control alone. These include reclamation of farm lands along the rivers, pollution, sanitation, conservation and power. The association favors a system of reservoirs on the upper reaches of the rivers to store up flood waters and utilize them later. It holds that such a project must include the whole area encompassed by the two rivers.

Representatives James Byrnes of Green Bay and Frank Keefe of Oshkosh pointed out that a survey of the Fox river and all of its tributaries, including the Wolf, was authorized at the last session of Congress, and that the next step is up to the Army engineers.

Among those attending the conference was Charles Seaborne, vice-president of Thilmany Pulp and Paper Company, Kaukauna, Wis.

McCarthy Joins St. Regis At Seattle Plant

SEATTLE — Justin H. McCarthy, a veteran of thirty years in the paper industry, has been appointed chief engineer at the kraft pulp division of the St. Regis Paper Company at Seattle, by Walter DeLong, vice-president and manager. A native of Portsmouth, N. H., Mr. McCarthy was graduated from Dartmouth College and was for 17 years with Hardy S. Ferguson, New York's noted industrial designer, who has helped construct mills all over the continent. Mr. McCarthy in recent years has been chief engineer at Soundview Pulp Company and was chief designer of the new whole log hydraulic barking and chipping plant there. He will undertake similar activities at the Tacoma plant of St. Regis.

Iron Curtain Hides Effect of North Woods Timber Strike

TORONTO — Just what is going on among the bushworkers in northern and northwestern Ontario is difficult to ascertain here. It is known that on October 12 a strike was called by union officials representing a division of the Brotherhood of Carpenters and Joiners and affecting, chiefly, pulpwood cutters. What information can be gathered suggests that the area around the Head of the Lakes has been the hardest hit by the strike, but there is also another area around Hearst in northern Ontario where cutting operations for export have been severely curtailed.

It is estimated that there are twelve to fourteen thousand men engaged in the pulpwood cutting in these areas and that not more than two thousand of them have so far quit work. It cannot be learned from the usual sources here just what the strike is about, but it is understood that all parties concerned have been invited to meet officials of the Ontario Department of Labor next week.

It is claimed by company representatives that the union has not approached any company or presented any formal demands and that the trouble does not stem from unsatisfactory wage rates because wages paid up to date are believed to be in line with those set in the recent union contract with Minnesota & Ontario Paper Co.

The usual charges of communist activities are made because the most trouble is found at the Head of the Lakes where there is a large foreign element and where Communist-tinged leaders are said to be in control of the unions.

Rates of pay for woods workers were set forth in an advertisement for workers by Abitibi Power and Paper Company in a Toronto daily paper this week. The advertisement offered general labor $5.90 a day or $35.40 a week; semi-skilled labor from $6.25 to $6.40 a day or $37.50 to $38.40 a week; skilled labor from $6.00 to $8.25 a day or $36.00 to $49.50 a week, depending on the job. (Cooks receive up to $54.25 a week.) Pieceworkers were offered $3.75 to $4.25 a cord. The rates are those approved by the Regional War Labor Board of Ontario on Sept. 17.

North Adams Proposes Paper Salvage System

NORTH ADAMS, Mass. — A new method of waste paper salvage in North Adams was discussed at a recent meeting of civic and fraternal groups at the Northern Berkshire Gas Company. No decision was reached nor will be until all groups who participated in the work can be brought together at a meeting.

Emile N. Trottier, salvage director for the city, suggested that each of the participating organizations set up committees of three men, four boys who will serve as carriers, and one truck. Such groups would serve all through the year and drives would be conducted at better spaced and more suitable times.

Under the present arrangement one or two organizations plan drives at specified dates which are picked by drawing lots, and proceeds are divided between them. The new plan calls for an equal distribution of all proceeds at the end of the year among the participating groups, each of whom will take part in every drive.

Paper Interests Said to Seek Ogdensburg Plant

WATERTOWN, N. Y. — Abe Cooper, president of the Bagley & Sewall Company, said that paper mill interests have been considering purchase of the Coplan Steel plant at Ogdensburg but that as yet no bona fide offer had been made. Mr. Cooper did not identify these interests. Mr. Cooper acquired the plant on September 25 for $100,000 from the Cleveland Container Company.

DEC 3 19

Deferiet Output Is Lifted 37½ Per Cent

DEFERIET, N. Y. — Output capacity of the Deferiet mill of the St. Regis Paper Company was increased by 37½ per cent last week with the initial operation of a newly completed Fourdrinier machine, the sixth, at the local plant. The new machine, with a 218-inch rating, designed to produce at 1150 feet per minute, has lifted the plant potential tonnage from 80 to 110 thousand tons a year. It occupies a newly completed building which is part of the rebuilding program for the St. Regis facilities. Other features of the installation are a new power plant, a new electrical distribution system, and a battery that will include six Roberts grinders when installation shall have been completed.

Highlights and details of the local share in the St. Regis six million dollar program were shown to a group of company officials and newspaper men on a trip of inspection through the mill last week when what has been and what still is to be accomplished was explained in detail. The visit was part of a program that ended on Thursday evening with dinner at which some sixty employes of the company were presented with medals celebrating completion of twenty-five years in St. Regis service. It also commemorated the 45th anniversary of the completion of the original paper mill in this village. The program at Deferiet, which includes also the installation of new machine coaters, is designed to increase the company's production of bleached groundwood, catalog, directory and magazine papers.

When present projects are completed, and when final arrangements have been made to take over the mills owned by *Time* magazine, total capacity, of the St. Regis properties will reach 360 thousand tons annually in printing, publication and conversion papers, according to President R. K. Ferguson who led the party on its inspection tour, and later addressed the members of the St. Regis quarter century club. This will represent an anticipated gross business of $75 million for 1946.

Kimberly-Clark Names Nelson Head of Expansion Program

NEENAH, Wis.—C. W. Nelson, chief engineer of Kimberly-Clark Corporation, will act as general manager of the corporation's expansion program in a new organizational arrangement announced by H. G. Boon, vice-president in charge of operations.

Allied appointments made to facilitate general expansion now in progress include that of A. G. Wakeman as assistant general manager, directing his attention to financial and statistical control phases of the expansion program, and the appointment of J. T. Whelan as acting chief engineer for Kimberly-Clark.

Brothers Join Collins As Superintendent

NORTH WILBRAHAM, Mass.—Eugene Brothers has been named the new general superintendent and plant manager of the Collins Manufacturing Company. Mr. Brothers formerly was general superintendent of the Curtis Paper Company mill at Harrisburg, Pa., and the main mill at Newark, Del. He made his home there until joining the Collins Co.

A native of Middletown, Del., Mr. Brothers has been in the paper business for twenty years, first joining the Curtis Paper Co. at its Newark, Del., headquarters where he remained for more than 19 years and then moving to the Curtis plant at Harrisburg. Later he returned to Newark as general superintendent. He was a member of the Superintendents' Association in Delaware and is associated with the Technical Association of the Pulp and Paper Industry.

Replacing him as superintendent of the Curtis Paper Co. mill in Newark was Howard Ferguson of Holyoke, who was formerly associated with the American Writing Paper Corporation.

Baum Interests Buy Hinsdale Mill Group

HINSDALE, N. H.—Sale of the Hinsdale Paper Manufacturing Company, which includes the Fiske Paper Mill and the White-Washburne Company, to Isadore Baum, his wife, Sarah, and son, Seymour I. Baum of New Rochelle, N. Y., was disclosed recently. The new owners took over the business from Lea Gratton and Harold R. Weeks of this town and Floyd Graham of Holyoke, Mass.

Baum announced he planned no change in policy or personnel. The three mills employ about one hundred persons in the manufacture and converting of toilet tissue and toweling.

Gratton and Weeks will remain with the company as general manager and assistant general manager, respectively. They will continue ownership and operation of the G. E. Robertson Company mill. The former owners purchased the Hinsdale company 22 months ago from Louis N. Stearns and Harold S. Garfield.

New officers of the company are: President, Isadore Baum; treasurer, Mrs. Baum; vice-president, Seymour I. Baum. The last mentioned, with his wife and two children, plan to establish residence in Hinsdale.

Ditto Plans New Plant

CHICAGO — Ditto, Inc., nationally known makers of duplicating machines and supplies, with headquarters in Chicago, is reported to have recently completed the acquisition of nearly thirty acres of land on Chicago's northwest side and plans to construct a modern plant with the first unit to cover 200,000 square feet of space. An office building will also be built.

Marathon Names Three To Higher Sales Posts

MENASHA, Wis.—Donald A. Snyder, director of sales, last week named three sales executives of Marathon Corporation to higher posts. A. W. Stompe, Neenah, was appointed general sales manager; R. A. Nash, Neenah, was named manager of the company's Eastern sales district, and Russell C. Flom, Menasha, was appointed manager of sales promotion. The appointments, Mr. Snyder's announcement stated, are part of a program of sales administrative and staff changes designed to handle increased sales resulting from Marathon's manufacturing expansion program.

Mr. Stompe will have charge of all Marathon field selling activities carried out by 90 field sales representatives. He has been with Marathon for 20 years, his experience including field selling and general sales executive positions, most recently as manager of jobber sales.

Mr. Nash has been with the company for 21 years, much of the time as a New York sales representative and for the last four years he has been in charge of bakery sales.

Mr. Flom also has been with Marathon for 21 years. He has been office manager, manager of war products sales, and most recently manager of specialty packaging sales. Stompe and Flom will have their headquarters at the Menasha office, and Mr. Nash will have his office in New York City.

River Raisin Elects Gray Chairman

MONROE, Mich.—The Board of Directors of the River Raisin Paper Company, at its October meeting elected J. Frank Gray, president, to be chairman of the board; Charles L. Wood, vice-president and general manager, was elected to be president and general manager; J. W. Walter continues as secretary-treasurer; E. C. Hollingsworth, general sales manager, was advanced to be vice-president in charge of sales.

The Board of Directors includes the officers and W. P. Smith and B. K. Walter.

Pineo Succeeds Stewart as Brunswick Technical Head

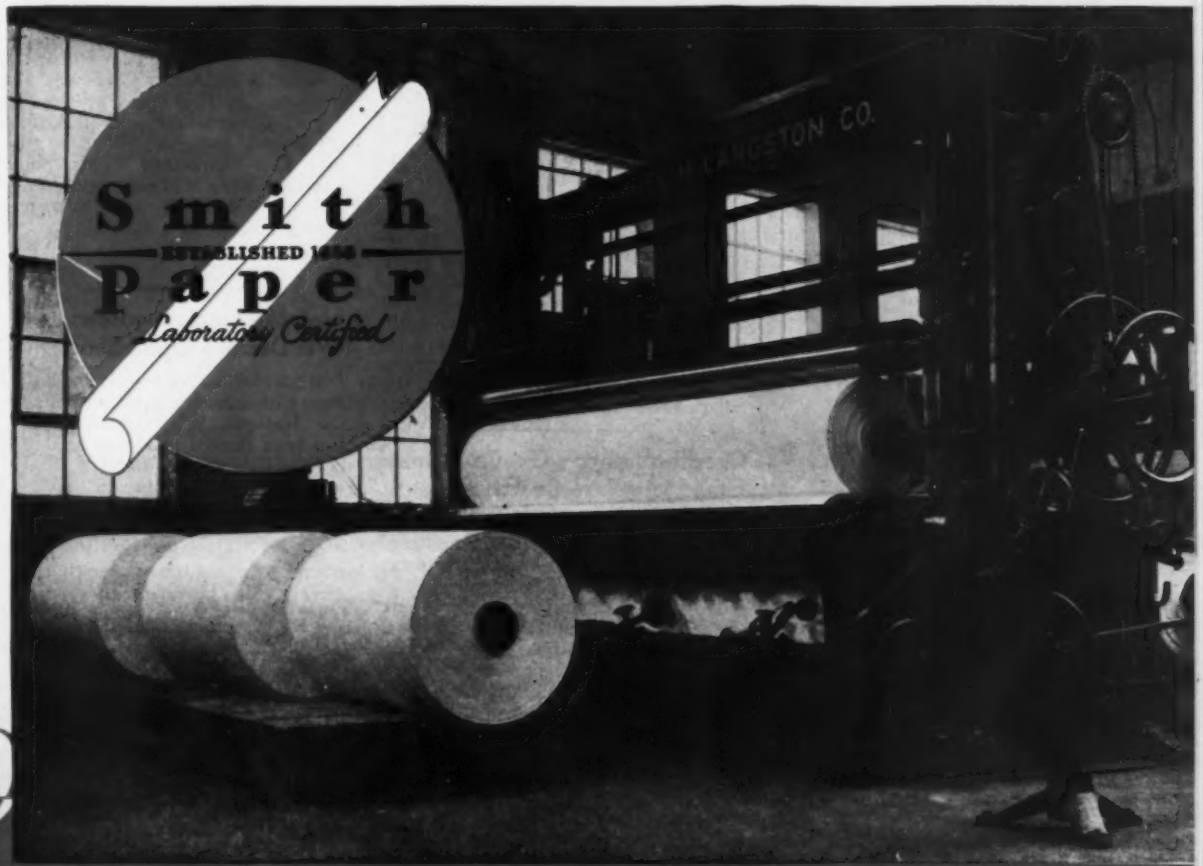
BRUNSWICK, Ga. — E. A. Harper, technical director of the plant of the Brunswick Pulp & Paper Company for five years, has resigned to accept a position in another city. Malcolm Pineo, of the Scott Paper Company, Chester, Pa., will succeed Mr. Harper here. Mr. Pineo, who assumed his new duties October 21, has been with the Scott Paper Company for 12 years. He is a graduate of the University of Maine and a special student at the Institute of Paper Chemistry at Appleton, Wis.

Flint and steel have been associated in people's minds for a lot longer than any of us can remember. ***It has been a successful combination.***

So also is the team of Langston and Smith. Langston Slitters help Smith Paper, Inc., to turn out cigarette tissue of the very finest quality. There is no guesswork in that plant, thanks to Smith's 109 years of manufacturing experience, and the use of such dependable and efficient machinery as the Langston Slitter. For a true, clean cut, for rolls of uniform density from core to outside diameter, ***for unbeatable performance, high speed operation and low maintenance, specify Langston.***

SAMUEL M. LANGSTON COMPANY

CAMDEN, NEW JERSEY



Langston SLITTERS · AND ROLL WINDERS

Tissue Men Meet At Shawnee

STROUDSBURG, Pa.—With the hearty cooperation of the weatherman, the annual fall meeting of the Tissue Industry held at Shawnee Country Club was a most successful and pleasant get-together. The sessions opened with a board of directors meeting on the 14th followed by an open meeting of the Tissue Association, Inc., the morning of the 15th, presided over by Joel S. Hartman, president of the Association.

At this meeting, E. G. Amos, secretary of the Industrial Relations Committee of the American Paper and Pulp Association discussed recent developments in the field of labor relations. Dr. E. C. Jahn of the New York State College of Forestry at Syracuse, who had just returned from ten months in Finland, Norway and Sweden, then spoke on the Scandinavian pulp situation. This was followed by a round table discussion by Messrs. Kittelle, Sawyer and Lamb, association counsel, of recent developments in the field of trade regulations.

After transacting Association business, the meeting was adjourned for luncheon and the golf tournament on the beautiful Shawnee course. The golf committee of Sam Lopin, Hudson Pulp and Paper Company, chairman, John McKirdy, Jr., Scott Paper Company, and John Maloney, Hoberg Paper Mills, had arranged an interesting and amusing event with a variety of prizes for various accomplishments on the course and elsewhere. Sam Lopin of Hudson Pulp and Paper Company and Louis A. Straubel, Jr. of Straubel Paper Company tied for low net with Gordon L. Ware of Straubel Paper Company a close third.

At the industry dinner, Tuesday night, President Hartman first presented E. W. Tinker, executive secretary of the American Paper and Pulp Association, who gave an informative talk on overall industry problems. Mr. Hartman then presented John Maloney of Hoberg Paper Mills, who acted as toastmaster.

Scheduled meetings ended on Wednesday morning with a meeting of the Tissue Industry Advisory Committee for OPA at which mutual problems of the industry and OPA were discussed informally with OPA representatives.

Box Makers Elect Shaw

PHILADELPHIA—At a recent meeting of the board of directors of the National Paper Box Manufacturers Association, C. Knowlton Shaw, Jr., of Shaw Paper Box Company, Pawtucket, R. I., was elected vice-president of the association to fill the vacancy caused by the death of William J. McClintock, Jr., of the McClintock Corporation, Harrisburg, Pa., who died shortly after having been elected to office last May.

Control Removed from Sensitized Paper

WASHINGTON, D. C.—Removal from price control of special sensitized paper used for reproduction of architects' and draftsmen's drawings in the blueprinting, brownprinting and whiteprinting processes was promulgated last week by the Office of Price Administration.

The exemption of special sensitized paper, effective October 25, was made on the basis that this item is unimportant in living or business costs and follows recent decontrol of office supplies. This type of paper is essentially an item of office supplies and has only highly specialized commercial uses.

Flat woven cotton wicking, OPA said, was recently suspended from price control on the basis that difficulties of administering effective ceilings would be disproportionate to the resulting contribution to stabilization. On the same basis, today's action suspends wicks made principally of this material from price control.

Carter, Rice Celebrates 75th Anniversary

BOSTON—Its 75 years of service to printers, publishers and other users of paper in New England was celebrated by Carter, Rice & Company Corp., by mailing to more than 4000 customers and friends of a special brochure detailing in words and pictures the history of the concern and presenting a pictorial record of the present-day services and facilities of a "great paper service house."

Most interesting illustration in the booklet was a reproduction of the original bill of sale under which the late James Richard Carter and Fred W. Rice established the company on January 2, 1871. Since that day, the services of Carter, Rice have been expanded to a point where the organization is now one of the largest distributors of paper in the east.

Credit Women's Group Names Elma Hanson to Board

SEATTLE — Miss Elma Hanson, acting credit manager of Blake, Moffitt & Towne, has been named to membership on the executive committee of credit women's groups of the National Association of Credit Men. Miss Hanson has been a member of the Seattle Credit Women's Club, fourth largest credit women's group in the United States, since 1938, and holds the office of vice-president.

Hazel Ludke Addresses Kiwanis

APPLETON, Wis.—"Determining Industrial Capability With the Orthorator Machine" was the topic of a talk by Mrs. Hazel Ludke of the Institute of Paper Chemistry before the Appleton Kiwanis club at Hotel Conway.

Rails To Restore Container Rules

CHICAGO—Western carriers have not as yet taken action but there is a great deal of interest here in a new rule, No. 41, which governs the specifications for tensile strength of fiber shipping containers which will go into effect in official ICC and southern classification territories on December 31. According to railroad sources, eastern and southern carriers will publish a rule virtually duplicating the prewar regulation in effect before November 15, 1941, when the rule was relaxed under pressure from the Office of Production Management in anticipation of a paperboard shortage. Action from the western carriers is expected within the next ten days.

The present wartime version of Rule 41 expires December 30. It represented, according to local informants, something of a compromise in that OPM officials first asked an outright cancellation of the regulation to permit industry to ship merchandise with no packaging restrictions whatever. A combination of lower standards for fiber containers, "green" labor in both railroad freight houses and in industry shipping rooms and heavier loading of freight cars during the war, caused loss and damage claims to soar. In 1942 the railroads attempted to tighten up the specifications for containers but the proposal was finally dropped. In 1943 the War Production Board agitated for a further liberalization of the rule but this attempt was also abandoned. This Summer, hearings were held on a special docket covering Rule 41 and eastern and western lines have now decided, it is reported, to go back to the prewar specifications.

Holyoke Elects Andrews; Will Declare Open Shop

HOLYOKE, Mass. — Michael X. Andrews of this city, general manager of the Holyoke Wire and Cable Corp., has been elected president of that concern. He succeeds the late Mrs. Harold T. Smethurst of New York. The firm serves Holyoke paper mills.

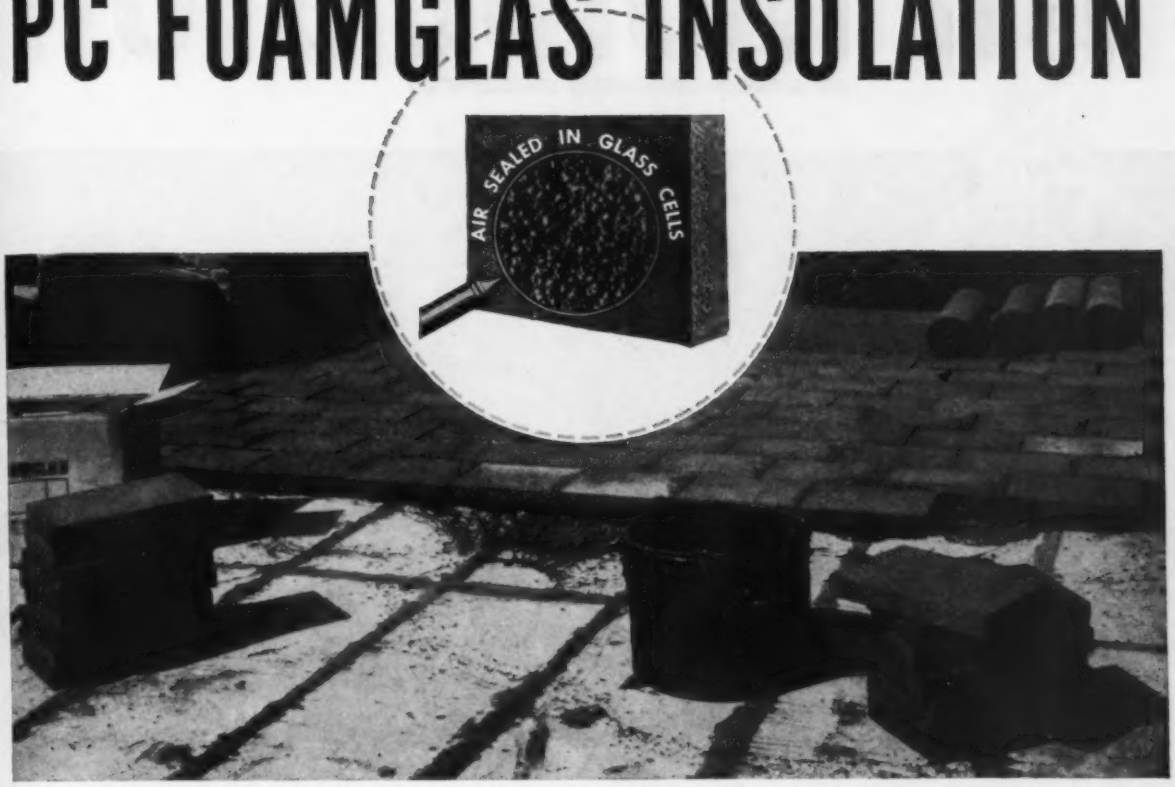
Mr. Andrews was authorized by the directors to negotiate the various points now in dispute to settle the five-week strike. However, the final agreement must be approved by the board.

Guatemalans Visit Bag Plant

CAMDEN, Ark.—Two Guatemala industrialists, Licolo Oscar Benitez and Sigmund Schacer, both of Guatemala City, recently visited here to visit the International Paper Company's paper mill and bag plant. Senor Benitez is a member of the Guatemalan Congress and chairman of the Committee on National Defense. Senor Schacer is a leading industrialist of the country. Both are touring American industrial plants.

SAVE TIME AND MONEY WITH

PC FOAMGLAS INSULATION



AN important cost factor in insulating jobs is the labor cost of installing the insulating material. And men who have used many kinds of insulation can tell you that PC Foamglas is so light in weight, so conveniently packaged, that it can be installed more quickly by fewer men — saving both time and money.

PC Foamglas, the cellular glass insulation, is fireproof, waterproof and verminproof. It is unaffected by excessive humidity, impervious to common acids. It therefore retains its original insulating efficiency indefinitely, without repairs or maintenance. That means protection against the additional cost which is incurred when defective insulating material has to be torn up and replaced.

In walls and floors, on flat deck roofs, of all sorts of plants all over the country, PC Foamglas is helping to maintain desired temperature levels, to minimize condensation, economically, *permanently*.

You will find a lot of helpful information in our manuals on PC Foamglas insulation. Lavishly illustrated, they contain valuable engineering data, tables, charts and installation details. Check your choice on the convenient coupon, mail it to us and free copies of our booklets will be sent to you promptly, without obligation. Pittsburgh Corning Corporation, Room 203, 632 Duquesne Way, Pittsburgh 30, Penna.

LIGHT IN WEIGHT, rigid and strong, PC Foamglas is conveniently packaged for easy handling on the job. It can be installed quickly by minimum crews, thus saving time and labor cost.

Pittsburgh Corning Corporation
Room 203, 632 Duquesne Way
Pittsburgh 22, Pa.

Please send me without obligation, your free booklets on the use of PC Foamglas insulation for:

Roofs_____ Walls_____ Floors_____

Name_____

Address_____

City_____ State_____

· Also Makers of PC Glass Blocks ·

PC FOAMGLAS *Waterproof Fireproof* **INSULATION**

T. M. REG. U. S. PAT. OFF.

THE INSIDE STORY

IT PAYS TO KNOW *MORE* ABOUT

HERCULES

RY OF SIZE

Hercules can help keep products *inside* your containers with a complete line of wax rosin sizes and wax emulsions. Hercules Paracols* (wax emulsions) and plasticized dry rosin sizes form a group of sizing agents which impart the high degree of water resistance required in containers such as milk and ice cream cartons, paper cups, frozen food containers, coasters, butchers' papers, and wrappings for moisture-laden foods.

Paracols added at the beater, applied at the size press, or the calender stack, improve finish and reduce curl, as well as contribute to water resistance. Because of their wide range of properties, these Hercules products permit virtually tailor-made selection for almost any wax sizing need.

Write for details on these and other Hercules sizes and papermakers' chemical materials.

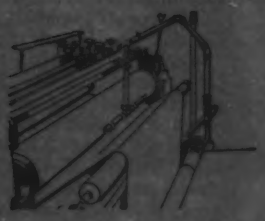
*Reg. U. S. Pat. Off. by Hercules Powder Company

Hercules chemical materials for the paper industry include:

Staybelite* Esters...
Wax additives for coating and laminating processes, modifiers for GRS and Neoprene latices for impregnating and laminating paper and board stocks.

Hercolyn*...
A liquid resin for transparentizing. Possessing excellent fiber-wetting properties, it is useful for the production of transparent and translucent papers.

Chemical Cotton...
Hercules chemical cotton is a pure cellulose, in loose or sheet form. Cleanliness and brightness are outstanding.



Casein...
Hercules casein is used as the binder in clay-coatings, and as an adhesive in laminants and paper converting.

Paracols*...
Water-dispersible wax emulsions used to increase finish, flexibility, printability, and waterproofing of paper.

Chemicals...
These include sulphonated oils, foam killers, sizers, acids, alkalies, alum, and satin white.

FOR FURTHER DETAILS

Papermakers Chemical Department
HERCULES POWDER COMPANY
INCORPORATED
962 King Street, Wilmington 99, Delaware

Please send information on_____

_____

*Name*_____

*Title*_____

*Company*_____

*Street*_____

CHEMICAL MATERIALS FOR THE PAPER INDUSTRY

Wisconsin Court Upholds Employment Relations Board

MADISON, Wis. — A worker cannot be discharged for failure to join a union in a plant which has a closed shop agreement in violation of a state law. The Wisconsin State Supreme Court issued a decision to this effect on October 22 in a case involving the Rhinelander Paper Company, Rhinelander, Wis., and the International Brotherhood of Papermakers Local 66 (AFL) on the one hand, and the Wisconsin Employment Relations Board on the other.

The case, which was held in abeyance by the Supreme court because of the war, involved the discharge of an employe, Gwynne Netling, for failure to join the union.

The court upheld Circuit Judge Gerald J. Boileau, who ruled on March 11, 1944, that the paper company must reinstate Netling. Judge Boileau held that an agreement between the union and the company could not force Netling to join the union because it was not made under provisions of the Wisconsin Employment Relations law, which requires 75 per cent of all employes to vote for a union before a closed shop agreement can be signed. The agreement was signed after an election had been conducted at the plant by the National Labor Relations board.

The supreme court held in its decision last week that when congress passed the National Labor Relations Act, it did not intend to limit state laws to enact labor legislation, or to permit agreements which were in violation of state laws.

After Netling had been discharged he appealed to the Wisconsin Employment Relations Board, which ruled the Rhinelander company guilty of an unfair labor practice, ordered him reinstated and directed that the union and company each pay one-half of his back wages.

Creditors to Name Norwood Trustee

NORTHAMPTON, Mass. — The first meeting of the approximately 250 creditors of the bankrupt Norwood Engineering Company of Florence will be held before Bankruptcy Referee Walter L. Stevens at the courthouse here shortly.

The main business of the meeting will be the election of a trustee in bankruptcy to take control of the Norwood assets, and it is expected that a spirited contest may develop around this matter. It is understood that under the federal laws, a trustee must have both a majority in amount and number of the creditors, and failing this, the trustee is appointed by the referee.

It is reported from reliable sources that the law firm of Choate, Hall & Stewart of Boston, counsel for the Westinghouse Electric Corp., is advocating the election of Atty. Luke F. Ryan of this city as trustee because of his previous experience as a factory manager.

It is also reported that representatives of the Krock brothers, who at present control the company, have been soliciting proofs of claim and powers of attorneys from creditors.

It is understood that whoever is elected bankruptcy trustee will have an opportunity to intervene in the several suits in equity now pending in the superior court in this state, which were brought to rescind the assignment for the benefit of creditors and the auction of the Norwood company assets last May.

400 Attend Hi Jinks Fete Of S. Cal. Paper Club

SANTA MONICA, Cal.—The Paper Mill Men's Club of Southern California recently went all out observing their club motto, *In Omnia Promptus* (Ready for Everything), to stage their most successful Hi Jinks in eleven years. Every year since 1935 the Paper Mill Men's Club has sponsored Hi Jinks, at which time they are host to the Paper and Twine distributing trade. This year nearly 400 were in attendance at their Hi Jinks which was held at the famous Riviera Country Club.

In the afternoon, one hundred Mill Men and Jobbers played in a golf tournament. Those not interested in golf, participated in a thrilling softball game between the Jobbers and the Mill Men. This year, for the first time, the Mill Men were successful in winning by a score of 26 to 25. In the evening, a special banquet was held, which was followed by an elaborate floor show. The Paper Mill Men's Club always conduct a charity fund Sweepstakes Sales, and this year the sale of tickets and the raising of the charity fund was an outstanding success.

Butler Talks on Office Problems

WORCESTER, Mass.—Charles E. Butler, office manager of Norton Company, spoke on "Organization of Office Force and Establishment of Procedures" at the second meeting of the education committee course of Worcester Chapter, National Office Management Association, last week in the conference room of the Worcester Telegram and The Evening Gazette. George E. Sund, education committee chairman, presided.

Murray Toll Acquires New Site

PHILADELPHIA—Murray Toll, manufacturers and mill agents of paper and paperboard products, recently purchased a 25,000 square foot one-story building at 6224 Paschall Ave. The company, formerly located on Jackson Street, is now firmly entrenched in its new quarters and ready to take care of both new and old customers.

Finch, Pruyn Celebrates An Anniversary

GLENS FALLS, N. Y.—Finch, Pruyn & Company, Inc., recently observed the forty-fourth anniversary of its incorporation under state laws. Starting on a small scale the company expanded rapidly until 1910 when the growing business required installation of a third paper machine. From the beginning of operations the principal production has been confined mostly to newsprint, catering to many publications in the largest cities. Among the customers for many years until it purchased its own mill at Plattsburg was the Imperial Wall Paper Co.

During the early thirties the demand for newsprint paper, with other commodities, was severely affected during a depression and to offset the loss it was decided to start production of groundwood paper specialties, the principal grade being the raw material for wallpaper manufacturers. Demand for the new lines increased rapidly during the war period with the result that a major portion of the machinery was switched from newsprint production. At the start of 1945 about one-third of the production was confined to newsprint.

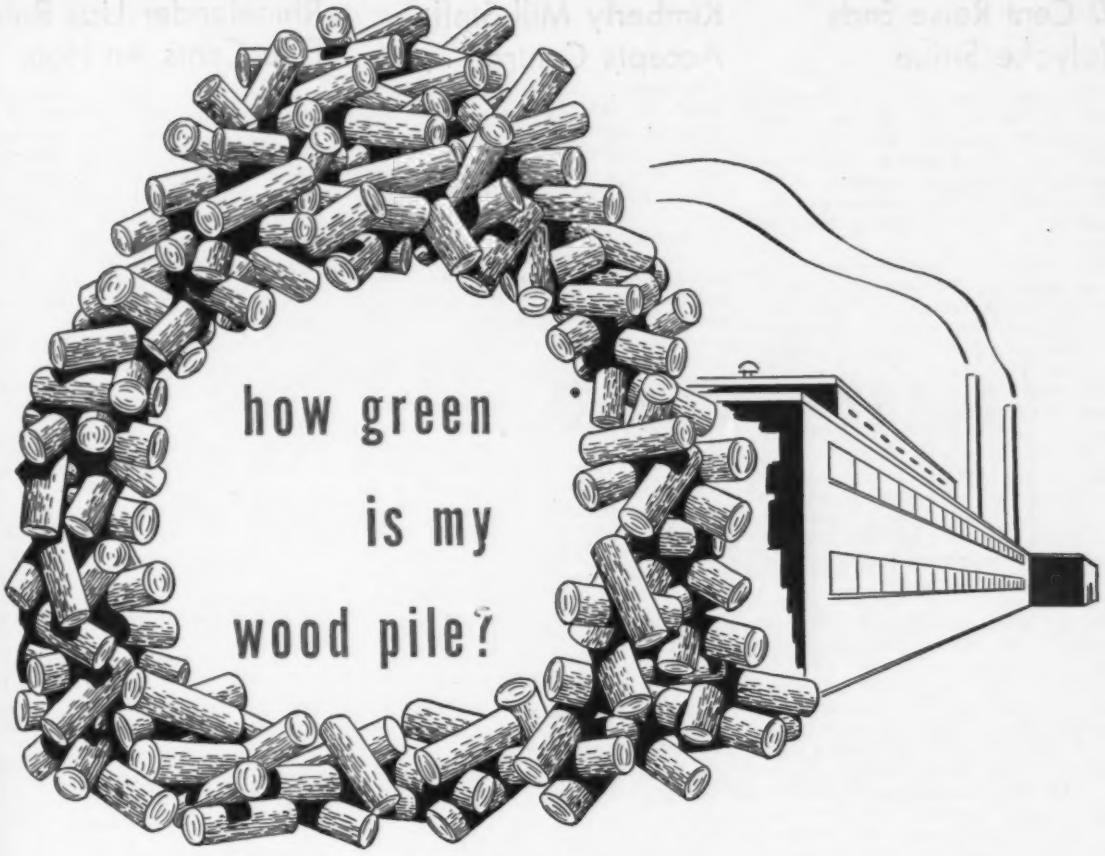
During the war a large number of previous users of book paper were compelled to resort to groundwood papers to obtain their reduced requirements and the experience proved that such grades were superior for many printing purposes. However, the groundwood grades are highly specialized being manufactured with new techniques for the requirements of the customer. Extensive changes and improvements have been under way at the mills for some time past which will enable production of higher quality paper besides insuring full continuous operations and full employment of personnel.

Sandy Hill Club Initiates Melvin

HUDSON FALLS, N. Y. — A recent visitor to the Sandy Hill Iron & Brass Works, was J. I. Melvin, managing director of Bertrams Limited, Edinburgh, Scotland, on his fourth trip to this section. During a meeting of the Sandy Hill Club he was initiated as a member in recognition of his numerous suggestions on machine design and other help which aided the firm greatly. He was the recipient of a gold pin denoting membership, and responded with complimentary remarks.

Jensen Advances in Stewart Organization

NEW YORK — James M. Jensen has been elected to the newly-created executive position of Assistant to the President of James Stewart & Co., Inc., engineers and contractors. Mr. Jensen has been associated with the Stewart company for 31 years.



for pitch control MERTANOL 7L

Pitch troubles arising from unaged wood are becoming more troublesome today. But you can stop pitch troubles before they start: Two to six pounds of Mertanol 7L per ton of paper, added to the beater, is serving in many mills these days as adequate insurance against hours of shutdown time that uncontrolled pitch can cause.

Mertanol 7L, a neutral water solution of a synthetic organic sulfonic acid condensation product, apparently controls pitch in two ways:

. . . by helping to keep pitch dispersed

. . . by absorbing pitch physically, much as do the fillers sometimes used for pitch control.

If your operations are suffering from pitch problems . . . plugging of screens and wire, sticking of wet paper to press rolls and drying cans, or spotted paper . . . we suggest you try Monsanto's Mertanol 7L, especially developed for pitch control. Samples, technical data or the help of our paper technicians are yours for the asking. Write, wire or phone: MONSANTO CHEMICAL COMPANY, Merrimac Division, Boston 49, Massachusetts.

Mertanol Reg. U. S. Pat. Off.

MONSANTO CHEMICALS
SERVING INDUSTRY . . . WHICH SERVES MANKIND

10 Cent Raise Ends Holyoke Strike

HOLYOKE, Mass. — The prolonged strike at Holyoke Wire & Cable Company which serves the Holyoke paper mills, is at an end with a ten-cent-an-hour pay increase, and a portion of the 250 workers at the company's two plants will be back at the machines on Monday.

The settlement was reached at a mass meeting of the workers at Washington Hall on Dwight St. last night after a basis for possible settlement between union and company officials had been reached earlier.

The workers at the Main Street plant of the company, which number about 85, will resume work definitely on Monday, while the Water Street plant, which employs the larger number of workers, will resume operations just as soon as mechanical trouble at this mill has been rectified. All employes must report for work within five days after negotiations.

The settlement was reached on the following basis: maintenance of membership, time and a half after eight hours, ten cents an hour increase in pay (the union sought 18 cents an hour and the company offered five cents an hour); three holidays with pay; 5 holidays with time and a half if worked; the checkoff system; general seniority clauses; 24-straight hours vacation pay for anyone working over six months and up to a year; 40 hours from one year to five years' employment and 80 hours for anyone employed for over five years. The settlement was reached on a unanimous vote.

The meeting was handled by Arthur Houle of Providence, organizer for the AFL International Brotherhood of Electrical Workers. The local union leaders were T. Marion, president; Christopher Leary, vice-president; Lee Guimond, recording secretary; Lena Belisle, financial secretary; Rose Pardar, treasurer; and William Mercier, business agent. Acting for the company during negotiations were Michael Andrews, president, and Atty. Edward Cooley of Springfield.

Lancaster Advances Two To Facilitate Expansion

BERLIN, Conn. — President Edward S. Lancaster of the American Paper Goods Company has created two new posts to expedite the firm's program of expansion.

Clifford A. Bomba takes the post of industrial service manager and Bruno Moski the office of production superintendent to relieve Lewis T. Shipps, factory superintendent, of all production problems and personnel work in order that he may concentrate on the design, manufacture or purchase of all new machinery and equipment in the plant. Both Bomba and Moski have been with the company several years.

Kimberly Mill Staff Accepts Contract

KIMBERLY, Wis. — Members of the Kimberly Mill Workers union have voted to accept a labor contract with the Kimberly-Clark management, calling for a general wage increase for those departments where scheduled hours have been cut back to 36 and 40 hours per week. The day model maximum for each hourly paid occupation is being increased five cents per hour and all actual day rates are being similarly increased five cents per hour. A two-cent increase is retroactive to July 1, the additional three cents going into effect October 21, making the hourly base rate ninety-four cents, including a rate increase of 23 cents since V-J day. Under an individual rate adjustment system, some skilled labor will receive from one to seven cents per hour more in addition to the five cents.

Employes will receive 40 hours sick leave for 1947, and any unused sick leave in 1944, 1945 and 1946 will be accumulated, to a maximum of 120 hours, with the addition of 40 hours making a total of 160 hours. Double time will be paid for work on New Year's day.

Council Disapproves of Financial Statements Bill

HOLYOKE, Mass. — Papermakers of the state have been urged to vote "no" on the Barnes bill referendum, which will be on the state ballot November 5. The proposed legislation, if enacted into law, would require unions to file financial statements which would be open to public inspection.

This action was taken at a New England District Council of Papermakers' meeting in Fitchburg, last week. About 100 delegates attended and it was resolved to instruct all local unions to have the membership vote against the Barnes bill.

Edward Moore of Holyoke, organizer for the Papermakers International Union, spoke.

Matthew J. Burns of Albany, N. Y., national president, told the delegates that the industry's locals which have been affiliated with the United Mine Workers, will be returned to the International Brotherhood of Papermakers, A. F. of L. He urged strengthening of paper unions in the United States and Canada.

Union Asks Marinette Vote

MARINETTE, Wis. — The International Brotherhood of Pulp, Sulphite and Paper Mill and Converting union, AFL, has petitioned the National Labor Relations Board for an election to determine whether the employes of the Marinette Paper Company wish to be represented by the union as their bargaining agent. It is expected that an early hearing will be held on the petition. There are about 450 employes involved.

Rhinelander Ups Rates Five Cents An Hour

RHINELANDER, Wis. — General increases of five cents an hour, effective October 21, have been accepted by about 700 employes of the Rhinelander Paper Company who are members of the International Brotherhood of Papermakers, and Pulp, Sulphite and Paper Mill Workers, it was announced last week by Emil Noren, Appleton, regional director of the Papermakers.

In addition, paper testers received two-cent hourly increases, a total of seven cents, and roll changers on calender stacks received 4 cents, a total of nine cents with two months of retroactive pay.

Mr. Noren said increases since V-J day now include twenty per cent on November 12, 1945, six cents per hour general boost June 1, 1946, and the new raise, bringing the average hourly rate for all employes to $1.15 per hour. In addition, workers will receive a Christmas bonus of $10 for those employes under a year, two and one-half per cent of the yearly wage for those with one to five years' service, and three and one-half per cent of the yearly pay for those with more than five years of service.

Vacations with pay are included in the contract and an insurance and hospitalization plan, with the company paying sixty-five per cent, also are in effect.

Stevens Stresses Role Of Superintendent

RENSSELAER, N. Y. — Winthrop Stevens, public relations director of F. C. Huyck & Sons, delivered an address on labor and management during the week before members of the Albany Industrial Club. Representatives of principal paper mills in the district were present at the meeting.

Mr. Stevens stressed the importance of the part the superintendent plays in any industry and is of the opinion that production can be increased only under the American system of free enterprise. He claims the attitude of the individual is a major factor in the efficiency of production and recommends briefing of objectives for the benefit of employes.

Else Kretchmer Dedicates Thilwerth Park

KAUKAUNA, Wis.—Mrs. Else Kretchmer of Appleton, daughter of Oscar Thilmany, unveiled the marker when Thilwerth park was dedicated Sunday afternoon, October 27, at the new addition to Kaukauna's park system. Karl E. Stansbury, president of the Thilmany Pulp and Paper Company, made the presentation of the marker. The Thilwerth park dedication followed several years of planning. The park has come into being through the efforts of the paper company and city officials.

DIRECT FEEDING OF HYDROGEN PEROXIDE

In Accordance with BECCO Methods... Has Many Advantages:

It guarantees uniform addition of chemicals at all times and, therefore, best results.

It eliminates the use of mixing tanks and weighing and handling of chemicals; it requires very little floor space for handling and preparing.

It eliminates spillage and wastage of chemicals.

It simplifies control of the bleaching process.

There are many advantages to be gained by bleaching groundwood pulp with BECCO HYDROGEN PEROXIDE bleaching methods. Why not investigate them?

BECCO's engineers and chemists are experts in the bleaching of groundwood pulp. For details write to:

BECCO SALES CORPORATION

AGENTS FOR BUFFALO ELECTRO-CHEMICAL CO., INC.

18 Sawyer Avenue, Buffalo 7, N. Y.

New York Boston Philadelphia Chicago Charlotte

Container Profits Up for 9 Months

CHICAGO—Container Corporation of America last week reported net profit for the three months ended September 30 of $2,110,557 equal to $2.13 a share on the basis of 848,978 shares outstanding. Net sales in the September 30 quarter was $22,283,135 against $18,084,331 while net profit before federal income taxes climbed to $3,686,382 from $2,205,610. Net profit for the first nine months of 1946 was $4,803,108 as compared to $1,301,962. The 1946 figure was equal to $4.85 an outstanding share while earnings in the first three quarters of 1945 amounted to $1.79 a share. Before federal income taxes, the net profit for the nine month period was $8,029,206 in 1946 and $7,070,405 last year. Net sales for the nine months ended September 30 were $62,999,135 compared with $56,494,266 for the similar period of 1945.

Gair Profits Show Rise For First Nine Months

NEW YORK—Robert Gair Company, Inc. and subsidiaries report for the quarter ended September 30, 1946, combined net profit of $600,355 after deducting provision of $297,000 for U. S. Federal Income Taxes, equal after preferred dividends to 31.4 cents per share on 1,641,924 shares of common stock. The combined net profit for the first nine months of 1946 after deducting provision of $847,000 for U. S. Federal income taxes, amounted to $1,728,191 equal after preferred dividends to 89.7 cents per share on 1,641,924 shares of common stock. For the same period in 1945 the combined net profit was $532,932 after deducting provision of $1,470,772 for U. S. Federal income and excess profits taxes, equal after preferred dividends to 24.9 cents per share on 1,231,467 shares of common stock.

The Board of Directors at a meeting held October 22 accepted the resignation of Arthur J. Bauser as assistant treasurer and elected him to be an assistant comptroller. C. Richard Bradley was elected assistant treasurer.

Mando Net Rises For Three Quarters

MINNEAPOLIS—Consolidated net income of Minnesota and Ontario Paper Company, from operations after provision for income taxes for the nine months ended September 30, 1946, was $1,125,490, as compared with $989,780 for the same period in 1945, according to a report. Net sales for the nine-month period were $19,060,859, as compared with $18,271,484 for the same period in 1945.

Operations for the third quarter were curtailed by an 85-day complete shutdown of the International Falls plant due to a strike.

President Davis further stated that the consolidated surplus account for the nine-month period reflects an additional credit of $323,088 resulting from the liquidation of investment in National Pole and Treating Co., and a credit of $510,423 resulting from the restatement on July 5, 1946, of certain Canadian assets less current liabilities at par with the U. S. dollar.

Kimberly Income Up 50 Per Cent

NEENAH, Wis. — Kimberly-Clark Corporation reported October 24 for the nine months ended September 30 a net income of $2,789,338, equal to $2.04 a common share, compared with $1,917,979, or $1.31 a share, a year ago.

Stone Containers Corp. Registers 300,000 Shares

CHICAGO—Plans for public financing by Stone Container Corporation, manufacturer of corrugated container and privately owned since it was started as a partnership in 1926, were announced today by Norman H. Stone, president. A total of 300,000 shares of common stock is being registered with the Securities and Exchange Commission — 200,000 for the account of the company and 100,000 for the Stone family and trusts, with public offering to be made by a national underwriting group headed by Hornblower & Weeks.

Proceeds of the company financing will be used to retire a bank loan and debentures which will leave the company free of debt and with capitalization consisting solely of 800,000 outstanding shares of common stock. The Stone family and trusts will retain 500,000 of the 800,000 shares to be outstanding.

The Stone organization has operated at a profit in each year since its inception. Sales totaled $7,771,877 for the year 1945 and $4,876,202 for the first seven months of 1946.

Gypsum Quarterly Earnings At More Than a Million

BUFFALO, N. Y. — National Gypsum Company reported net earnings for the third quarter of $1,114,824 compared with $209,029 in the same period last year. Sales for the quarter totaled $10,339,438 compared with $6,285,350 for the same period last year.

President Melvin H. Baker said the company's new plant program has been delayed for lack of steel and electrical equipment. Even though the company is producing at a high rate, it is able to supply only a small part of the current demand for its products.

FINANCIAL RECORD OF THE WEEK

New York Stock Exchange

High, Low and Last for Week Ending October 26, 1946

STOCKS

	High	Low	Last
A. P. W.	5¼	5	5
Armstrong Cork Co.	47½	46	46½
Celotex Corp.	27½	25⅝	25⅞
Celotex Corp., pf.	20¾	20½	20½
Certain-Teed Products Corp.	18⅜	16¾	17¾
Certain-Teed Products Corp., pf.	....	....	....
Champion Paper & Fibre Co.	24¼	23½	23½
Champion Paper & Fibre Co., pf.	109	109	109
Congoleum Nairn Co.	27¼	26½	27
Container Corp. of America	42⅜	40	41
Continental-Diamond Fibre Co.	10	9¼	9½
Crown-Zellerbach Co.	29⅜	28	28
Crown-Zellerbach Co., pf.	106½	106⅛	106½
Dixie Cup Co.	34	31⅜	31½
Dixie Cup Co.—A	....	....	....
Flintkote Co.	29	27¼	28¼
Flintkote Co., pf.	107	107	107
Robert Gair	8⅜	.7½	8⅛
Robert Gair, pf.	19⅝	19¼	19⅝
International Paper Co.	45⅛	42½	44¾
International Paper Co., pf.	102	98¾	102
Johns-Manville Corp.	129	122	122½
Johns-Manville Corp., pf.	120	120	120
Kimberly-Clark Corp.	25¾	24½	25¼
Mac Andrews & Forbes	34	33½	33½
Mac Andrews & Forbes, pf.	....	....	....
Masonite Corp.	52	50	51
Mead Corp.	22	20¾	21
Mead Corp., pf. 4¼	106	106	106
Mead Corp., pf. 2	48	46½	46½
National Container Corp.	30⅝	29¼	29⅞
Paraffine Companies, Inc.	60⅞	58	58
Paraffine Companies, Inc., pf.	107	105½	105½
Rayonier, Inc.	19¼	18½	18½
Rayonier, Inc., pf.	35½	35	35½
Ruberoid Co.	51	46	50
Scott Paper Co.	49	46	46
Scott Paper Co., pf.	103½	103½	103½
Sutherland Paper Co.	43⅛	42⅛	42⅜
Union Bag & Paper Corp.	29	26¾	27¼
United Paperboard Co.	12⅜	11¼	12⅛
U. S. Gypsum Co.	108½	106	107
U. S. Gypsum Co., pf.	....	....	....
West Virginia Pulp & Paper Co.	40½	39¾	40¼
West Virginia Pulp & Paper Co., pf.	115	115	115

BONDS

Abitibi Pulp & Paper Co. 5s '53	....	....	....
Celotex Corp. 3¼s '60	....	....	....
Certain-Teed Products Corp. 5½s '53	....	....	....
Champion Paper & Fibre Co. 3s '65	103¾	103¼	103¼
International Paper Co. 5s '47	....	....	....
Mead Corp. 3s '66	....	....	....

New York Curb Exchange

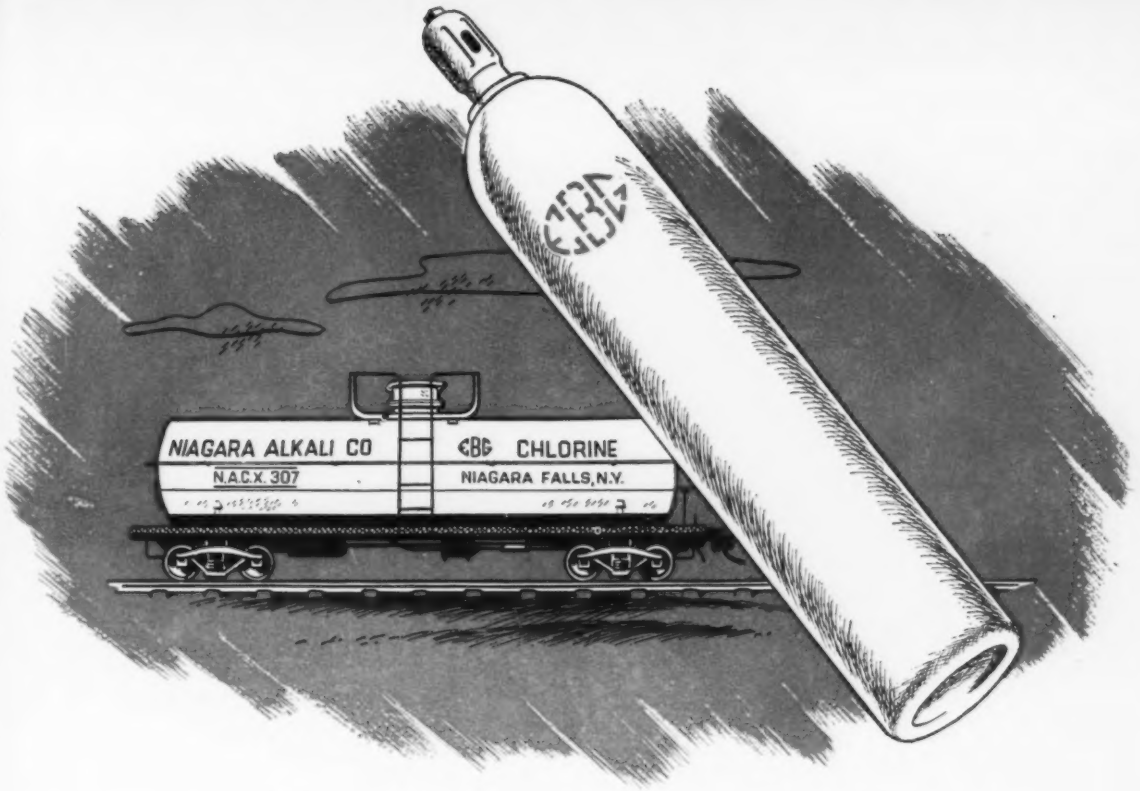
High, Low and Last for Week Ending October 26, 1946

STOCKS

	High	Low	Last
Great Northern Paper Co.	41½	40¼	40¼
Hummel-Ross Fibre Corp.	19	15¾	15⅜
St. Regis Paper Co.	10	9⅜	9⅜
Taggart Corp.	8	7½	7½

BONDS

American Writing Paper Co. 6s '61	100⅞	100⅞	100⅞



The importance

OF BEING NIAGARA EBG LIQUID CHLORINE

LIQUID CHLORINE continues to increase in importance not only as an agent for the purification of water and the bleaching of textiles, paper and other products but also as a convenient chemical "tool" for the development of new and useful organic compounds.

As the first American producer of this chemical and a pioneer in electrochemical product development, Niagara's service in Liquid Chlorine is backed by advanced knowledge and experience that can be of continuous value to you in obtaining the best results from its use.

A new 48-page booklet giving essential data on the uses, characteristics, physical properties and handling of Niagara EBG Liquid Chlorine is available on request. • • • Niagara Alkali Company, 60 East 42 Street, New York 17, N. Y.

An Essential Part of America's Great Chemical Enterprise

NIAGARA ALKALI COMPANY

CAUSTIC POTASH • CAUSTIC SODA • LIQUID CHLORINE • NIAGATHAL
CARBONATE OF POTASH • PARADICHLOROBENZENE

Australia Takes Count of Its Pulp and Paper Industry

PERTH, W. Australia — Figures recently released by the Commonwealth Statistician show that there are 12 papermaking factories, 85 factories making cardboard and corrugated boxes and cartons, and 83 factories manufacturing stationery and paper products in Australia. Number of employees in stationery manufacturing firms is 2,714, in box-manufacturing factories 3,622, and in papermaking establishments 4,758. Salaries and wages for the year 1944 were as follows: manufacture of stationery and paper products, 620,666 pounds (U.S. $2,979,197 at par); box making, 762,634 pounds (U.S. $3,660,643); paper bags, etc., 133,804 pounds (U.S. $642,259); and papermaking, 1,526,609 pounds (U.S. $7,327,723). Output per person was calculated as follows: manufactured stationery, 1,327 pounds (U.S. $6,369); boxes, etc., 1,036 pounds (U.S. $4,973); paper bags, 1,539 pounds (U.S. $7,387); and papermaking, 1,672 pounds (U.S. $8,025).

Among the articles produced for the year were: cardboard boxes valued at $16,499,712; cigarette papers (7,681,701,000) worth $1,695,293; envelopes worth $2,476,430; exercise books, registers, etc., worth $2,709,614; writing pads worth $1,237,195; stay paper and cloth worth $350,630; paper bags worth $4,349,078; and paper containers worth $2,567,578.

Overseas imports of newsprint for the month of May totaled only 5,801 tons. For the year to May the total imports were 93,802 tons. Only import from the United States during the month was of lithographic printings (75 tons).

New Paper Mill for Victoria

It is officially reported that a British company will shortly take over the Government guncotton factory at Ballarat (Victoria) and will establish a paper-making industry which will absorb about 2,500 employees (including nearly 1,900 males).

It is understood that the Federal Government has given permission for the importation of 500,000 packets of cigarette papers. Following allegations that such papers were being exported from Sydney in quantities, the Minister for Customs (Senator Fraser) promised an immediate inquiry.

Secretary Whitfield, of the Adelaide Waterside Workers' Federation recently alleged that good quality cigarette paper was in a cargo of waste paper received from Western Australia, and he offered to show samples at Parliament House. The PAPER TRADE JOURNAL representative followed up this allegation personally, visiting the only West Australian factory manufacturing cigarette papers (Michelides Ltd.) and found that the paper in question was wastage from machines, brought about by minor defects in the running of the machines, and quite useless commercially.

The Fruit Growers' Defense League, at a recent meeting, passed a resolution: "That the Government be asked to facilitate the import of fruit wrapping paper in sufficient quantity to eliminate delay in handling fruit; that licenses be granted for its free importation; and that Australian papermakers be approached with a view to its local manufacture."

Although permits for trade with Czechoslovakia are not yet universal, the Customs Department states that it will "sympathetically consider" applications to import papers and certain machinery from that country.

Regulations recently issued prohibit the export of all waste paper.

The Federal Cabinet has approved of the constitution of an association of national testing authorities to provide testing facilities for the maintenance of high industrial standards. State Governments have given their approval to this move, and the Prime Minister (Mr. Chifley) states that the State Governments, the Council for Scientific & Industrial Research, the Department of Post-War Reconstruction and the Department of Health will be asked to nominate representatives for the association's council. Main objects of the association will be: To investigate the standard of staff and equipment of laboratories submitted for registration; to promote the recognition of registered laborates as impartial authorities whose certificates will be accepted throughout Australia; to encourage the adoption of Australian standard methods of testing; and to procure the recognition of the association throughout the Empire and other countries.

It is considered that no less than 8,500,00 pounds of overseas capital (U.S. $40,800,000) is to be invested in business enterprises in this country, and at least $14,000,000 of this will come from the United States.

It has just been announced that Associated Pulp & Paper Mills, Tasmania, is installing new machinery to greatly increase its output of fine writing papers.

OBITUARY

Albert W. Harris

GLENS FALLS, N. Y. — Albert W. Harris, 72 years old, president of the Harris Importing and Exporting Co., died during the past week following a brief illness. He was the founder of the firm which organized in 1918 for the purpose of importing paper machinery, wire and felt from foreign countries. For several years he was associated with the International Paper Co. and Sir William Prince Co., Canada. His grandfather, the late Walter T. Harris, founded the Glens Falls Paper Co. which later became the International Paper Co. His widow and a son survive.

Daniel Fitzgerald

GREAT BARRINGTON, Mass. — Daniel F. Fitzgerald, 78, oldest engineer at the Rising Paper Company, was found dead in bed at his home last week. Dr. T. Frank Marnell, medical examiner, attributed death to a heart ailment. He had been ill for several weeks.

Born in Sheffield, the son of John and Mary Mahoney Fitzgerald, he moved to Great Barrington at the age of 15. For the past 40 years he was an engineer at the Rising Paper Company.

Harold B. Harwood

WETHERSFIELD, Conn. — Harold B. Harwood, manager of the Hartford branch of John Carter & Co., paper dealers, died at his home here last week after a long illness. Born in Lynn, Mass., Mr. Harwood came to Wethersfield 21 years ago. He became associated with the John Carter Co. in 1904 and was employed as a traveling salesman in New England until 1924 when he became manager of the Hartford branch.

Harry C. McNally

SYRACUSE, N. Y. — Harry C. McNally, 66, retired paper manufacturer, died recently in Memorial Hospital following a short illness. He retired from the industry many years ago, making his home in Skaneateles. He was a director of the National Bank & Trust Company of Skaneateles and a prominent sportsman. His wife and three sisters survive.

Sidney B. Fraser

DALHOUSIE, N. B. — Sidney B. Fraser, sulphite superintendent of the New Brunswick International Paper Company, died on October 10th. Mr. Fraser was born in Newfoundland on November 6th, 1906, and was continuously employed by the company since January 3rd, 1931. He is survived by his wife, Louise Fraser, and two sons, Bruce and Donald.

Hinde & Dauch Grants 18½ Cent Increase

CLEVELAND—The strike against the Hinde & Dauch Paper Company, which began on July 17, has been ended with a settlement providing for an 18½ cents wage increase. The plants started a return to operations on Monday, October 28, following the ratification of the terms of settlement by the United Paperworkers of America-CIO local unions. The settlement was brought about, in part, by the Sandusky, Ohio, Ministerial Association, which interceded upon the request of union officials.

The UPA-CIO locals at the Sandusky and Detroit box plants struck on July 17 to enforce wage demands. Other Hinde & Dauch plants were shut down the following week when the striking UPA-CIO locals established picket lines at the plants. The employes at the Sandusky paper mill and the plants at Gloucester, N. J.; Kansas City, Kans.; and St. Louis, Mo.; all covered by UPA-CIO agreements, refused to violate the picket lines. The Buffalo, N. Y., plant was shut down by strike action of the UPA-CIO local after weeks of negotiations had failed to produce an agreement between the parties.

The strike settlement, affecting the Sandusky and Detroit Hinde & Dauch plants, included a general wage increase of 18½ cents an hour. An additional 5 cents an hour will be paid to such maintenance employes as carpenters, machinists, lead electricians, pipefitters, welders, oilers, second-class steamfitters, and electricians and chief engineer. Thirteen and one-half cents are retroactive to April 15, the date contract negotiations began. It was the breakdown of these negotiations that brought on the strike.

With the settlement reached for the two plants, the workers at the other plants, except Buffalo, started their return to work. It is felt that the Buffalo dispute will be settled shortly.

Sandy Hill's Brochure Wins Achievement Award

LOS ANGELES, Calif. — Advertising experts representing agencies in all parts of the country submitted samples of their creations to a judging here, and a finely printed, informative and technically comprehensive brochure issued by the Sandy Hill Iron and Brass Works of Hudson Falls, N. Y., won first prize as an outstanding piece of advertising literature for a manufacturer.

The First Advertising Agency Group, made up of agencies in major cities of the country, was donor of the "achievement awards" of plaques. This 18-year old organization encouraged all its member-agencies to submit their finest pieces of sales literature, created over a period of more than a year. All judges voted that the unusually complete content, the technical accuracy, and the interesting manner of handling the Sandy Hill book earned it first prize.

The Sandy Hill brochure presents the line of products of the Hudson Falls firm in twelve sections, illustrating, describing and analyzing the functions of related pieces of equipment made by Sandy Hill. The book is replete with half-tone illustrations, and with artists' drawings of equipment, with engineers drawing to amplify the uses and typical installations. Hevenor Advertising Agency, Inc., of Albany, which handles the Sandy Hill Iron and Brass Works account, prepared the book.

Interested concerns may obtain a copy of the Sandy Hill Brochure by writing or wiring Frank A. Juckett, president of The Sandy Hill Iron and Brass Works, at Hudson Falls.

Brown Expands Sale And Service Staffs

PHILADELPHIA—A group of 45 new sales and service engineers have been added to the expanded field staff of the Brown Instrument Company. "The addition of 25 sales engineers and 20 service men," according to W. H. Steinkamp, field sales manager of the industrial division of Minneapolis-Honeywell Regulator Company, "is further evidence of the overall growth and expansion of our activities."

The group will be assigned, about the first of the year, to various regional offices and branches throughout the country, said Steinkamp. All of the men are now attending the Brown Company School of Instrumentation at Philadelphia.

Atlas Organizes Affiliate

HOUSTON, Tex.—The Atlas Mineral Products Company, manufacturer of acid- and alkali-proof cements, acid- and alkali-proof floors, plastic linings, jointing materials and protective coatings, has organized an affiliate organization, the Atlas Mineral Products Company of Texas, Inc. The new organization includes a manufacturing plant for sulphur cements and other firm products and handles the sales of Atlas products in the territory west of the Mississippi with the exception of Minnesota, North Dakota and eastern Missouri. It will also handle sales in western Tennessee, Mississippi and Louisiana.

Scott Declares Dividends

The Board of Directors of the Scott Paper Company has declared a quarterly dividend of 45 cents per share on the common stock, payable December 13, 1946, to shareholders of record at the close of business November 30, 1946, and also the regular quarterly dividend of 85 cents per share on the outstanding $3.40 cumulative preferred shares, payable Feb. 1, 1947, to shareholders of record at the close of business Jan. 17, 1947.

Building Is Started At Port Wentworth

SAVANNAH, Ga. — Construction of Southern Paperboard Corporation's new $11,000,000 mill at Port Wentworth, which will add a $30,000 weekly payroll to Savannah is scheduled to start Monday morning, November 4, at a dedication ceremony marking the driving of the first pile for the foundation of the mill.

Daniel Construction Company, of Greenville, S. C., and Birmingham, Ala., have the contract for the erection of the mill. James Rice will be in charge of construction work.

J. E. Sirrine & Company, of Greenville, are the designing engineers and their work has been directed by D. G. Moon. William J. Cantrell is resident engineer for Sirrine on the job.

The Southern Paperboard Corporation is a subsidiary of Robert Gair Company, Inc., with Georgia E. Dyke, president of the latter as chairman of the board; and Ernest Rossiter, president.

The procurement of wood and management of the woodlands acquired for Southern Paperboard's operations will be handled by another subsidiary, Gair Woodlands Corporation, under the direction of T. W. Earle, president.

Roland Wilber has been retained as manager of manufacturing; H. W. Borman as assistant to the president, and Charles Mason as personnel manager for the Port Wentworth mill, the full organization for which is still in the formulative stage.

New Norton Plant Will Expand Facilities

WORCESTER, Mass.—A new plant, to be devoted to the manufacture of vitrified grinding wheels, will be constructed next year on the old fairgrounds property, now owned by Norton Company. The new building will be adjacent to Plant 4, west of the railroad at Barber's Crossing.

Wheel manufacturing operations will be moved from Plant 6 to the new plant, which will be No. 7, and also to Plant 2. Eventually, however, the latter plant will be torn down.

During World War II, it became necessary to expand both wheel and abrasive grain manufacture, and since there was no more room in the West Boylston Street area, these developments were completed on C and D streets. Increased business since has used up all manufacturing and storage space, with the latter now being rented in various parts of the city.

The capacity of the new factory will be planned to obviate the necessity for two-shift operation except in extraordinary business activity.

It is not expected that manufacturing in the new building will begin before 1948, and construction will not get under way until the scarcity of building materials is relieved.

TITANOX... *the brightest name in titanium pigments*

IN PAINT Titanox-A gives opacity, promotes brightness, resists fading and adds durability to coatings for both interior and exterior use. IN PAPER
Titanox A imparts the important qualities of opacity, brightness and printability, and is easy to handle because of its ready dispersion quality. IN RUBBER Titanox-A supplies a high degree of whiteness, develops resistance to abrasion and sun discoloration. IN INKS
Titanox-A assures greater color stability and opacity.
INK

TITANOX-A ...*another First!*

In 1925, Titanox-A (Titanium Dioxide) was developed at Niagara Falls, New York, as a result of research by the staff of The Titanium Pigment Company, Inc. This was the first pure titanium dioxide pigment commercially produced in the United States... another "TITANIUM PIGMENT FIRST".

This new product was superior to any other Titanium pigment available up until that time and even approached present-day Titanox-A in opacity, whiteness and brightness. These improved characteristics make versatile Titanox-A the preferred pigment for a great variety of uses.

While keeping quality uniformly high, the makers of Titanox pigments are also exerting every effort toward increasing output to meet a tremendously expanded industrial need.

TITANOX TITANIUM PIGMENT CORPORATION
SOLE SALES AGENT

111 Broadway, New York 6, N. Y.
104 South Michigan Ave., Chicago 3, Ill.
350 Townsend St., San Francisco 7, Cal.
2472 Enterprise St., Los Angeles 21, Cal.

Instrumentation Studies. LV*

Determination of the Bonding Strength of Paper. I.
Progress Report on the Development of a New Method

By The Staff of The Institute of Paper Chemistry

Abstract

Various methods for the direct measurement of the strength of the bond between the surface and the body of a sheet are subject to errors such as those originating in penetration of the sheet structure by the adhesive, modification of the sheet by elevated temperatures where the adhesive requires heating, and strongly varying stress due to nonuniform thickness of paper. Accordingly, a method has been developed in which a tensile stress is applied by means which are relatively free of the foregoing errors. In the new apparatus the tensile stress arises in a viscous film in a manner simulating the actual printing operation in a rotary press.

The apparatus, which is described in detail, consists essentially of a pair of steel wheels or rollers having finely ground surfaces which carry films of known and constant thickness of a viscous oil of known viscosity. These wheels are caused to roll over test specimens under a known load with uniform but continuously variable speed. The speed of the wheels, which is accurately measured by means of an electric speed meter, is varied until that speed at which rupture occurs is determined. Descriptions of techniques and such auxiliary equipment as the viscometer, film-forming devices, and speed meter are given.

The critical speed is defined as that above which the test specimen suffers an open rupture. At speeds slightly below critical, coated papers exhibit a "blistering," which is caused by internal failure. As the speed is increased to the critical speed, the blisters become more extensive and open up, small bits of the surface adhering to the surfaces of the wheels. At speeds appreciably greater than the critical speed, the rupture is complete and general, large areas being carried away by the wheels. A critical speed is arrived at most quickly by the process of bracketing—that is, it is obtained by approach first from below, then from above, etc., experience and estimates serving to accelerate the search.

Of the several viscous liquids investigated, the most suitable has been blown castor oil. The viscosity range investigated and found suitable under the conditions of present work is approximately 0.3 to 3.0 kilopoises.

Investigation of the relationship between critical speed and viscosity for constant bonding strength shows that, within experimental error, the product (velocity) × (viscosity) = constant. This product (designated V.V.P.) is taken as a measure of bonding strength. In a special series of samples in which the casein content of the coatings varied from 10 to 22%, the V.V.P. varied from about 12 to 95 kp. cm./sec.

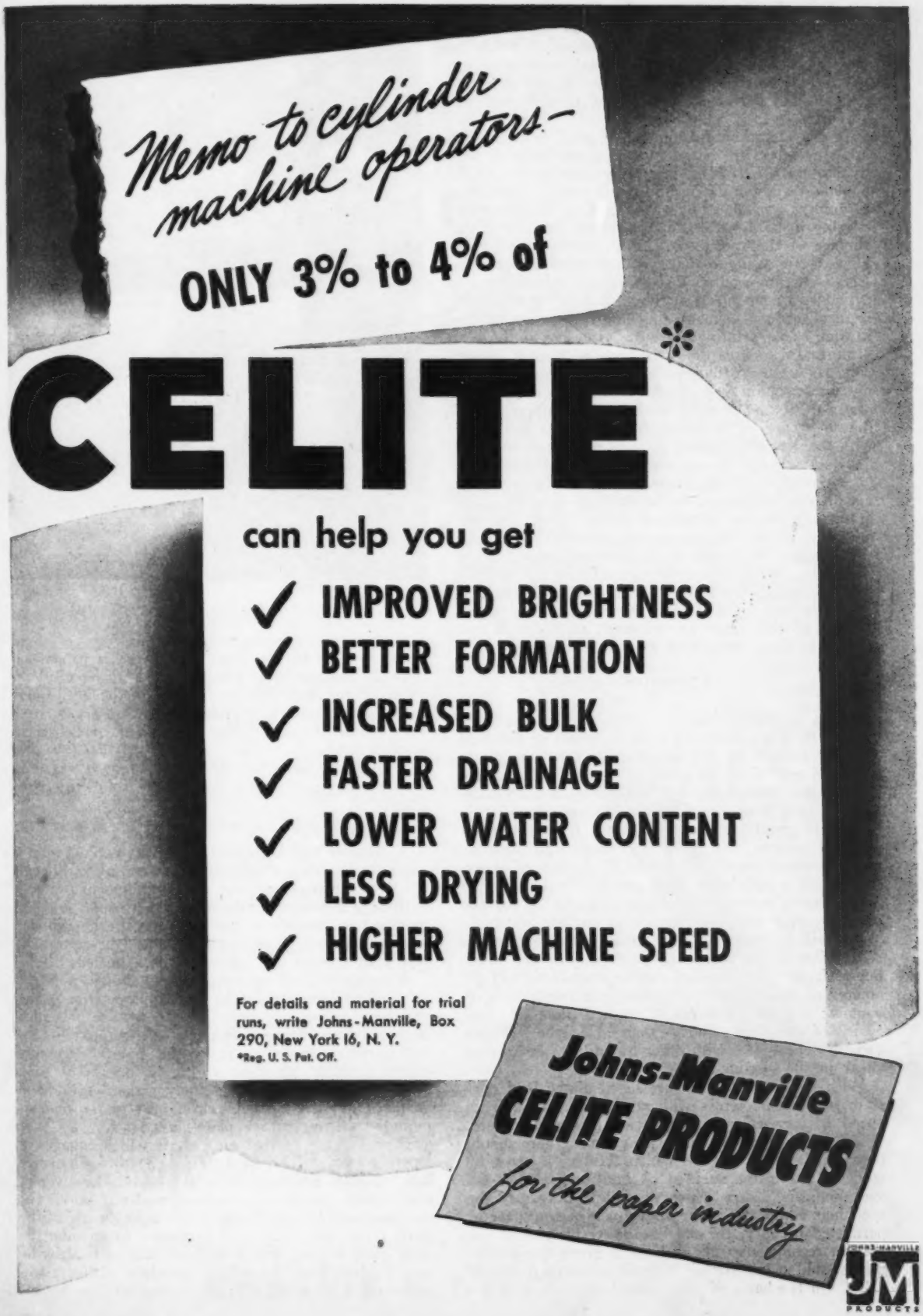
When the film thickness was varied from 0.0020 inch to 0.0008 and 0.0004 inch, two interesting phenomena were observed. At the greater film thickness, the V.V.P. of specimens having coatings containing 10, 14, and 18% casein was nearly a constant. At the smaller film thicknesses there were large differences between the V.V.P. of these three specimens. When the film thickness was 0.0020 inch, the failure of the sample containing the least casein occurred in the body stock rather than between the coating and body stock. At the smaller film thicknesses, only the coating of this sample was removed. The observations indicate that (a) the V.V.P. is reasonably related to casein content in a coated sheet and would probably serve as a useful measure of bonding strength, (b) local stress intensification is of greater importance in a thin film than in a thick film, in which the stress is more uniformly distributed, and (c) the coating system penetrates into the body stock during the coating operation, thereby causing a gradual transition from fiber to coating.

The desirable course of future work is indicated.

Early in the work on the wax pick test for bonding strength (details of this work will be reported later), a strong need was felt for a means of testing surface bonding strength which would provide fundamental information necessary to the whole study. In discussing various possible new methods, prime consideration was given to the desirability of a method which would, in the very act of testing, modify the specimen as little as possible. In particular, it was considered important that the surface bonding strength be evaluated by a method which would apply a normal tensile stress to the specimen by physical means which *(a)* do not appreciably change the temperature of the specimen, *(b)* do not alter the moisture content of the specimen, and *(c)* do not involve appreciable penetration of an adhesive into the specimen. These considerations eliminate many of the variations of the apparently straightforward idea of cementing flat solid surfaces to the two sides of a sheet, followed by measurement of the force required to disrupt the system thus formed. This measurement of "lateral tensile strength" is subject to possibly large error caused by nonuniform stress distribution over the area cemented to the test blocks. There is always an intensification of stress at the edge of the cemented area, and one would expect in most cases that strong variations in local stress over this area would result from nonuniform thickness of the paper. It is well known that the thickness of paper varies markedly from point to point. During the act of measurement of lateral tensile strength, the stress at a point of minimum thickness would build up at a maximum rate, and failure would definitely tend to occur first at that point; a localized failure results in a stress intensification at all other points and, hence, in generally premature failure. The analog of the foregoing state of affairs in ordinary tensile testing would be a tensile tester equipped with jaws having strongly curved instead of straight edges; if, in the analogous arrangement, the average length of specimen were 10 cm., the jaws might approach to within 7 cm. of each other, and the stressing would obviously be much greater for elements 7 cm. long than for 10-cm.

* This report is one of a series issued as a part of the Instrumentation Program of the American Paper and Pulp Association.

The data in this Instrumentation Study were reported to the American Paper and Pulp Association on March 23, 1942, as Report No. 31, Part III.


Memo to cylinder machine operators—
ONLY 3% to 4% of
CELITE*
can help you get
✓ IMPROVED BRIGHTNESS
✓ BETTER FORMATION
✓ INCREASED BULK
✓ FASTER DRAINAGE
✓ LOWER WATER CONTENT
✓ LESS DRYING
✓ HIGHER MACHINE SPEED
For details and material for trial runs, write Johns-Manville, Box 290, New York 16, N. Y.
*Reg. U. S. Pat. Off.
Johns-Manville
CELITE PRODUCTS
for the paper industry
JOHNS-MANVILLE
JM
PRODUCTS

lengths. Since the percentage extension corresponding to rupture is roughly constant and independent of the length of stressed elements, shorter elements would be clearly over-stressed, and the total rupture force would be substantially less than the ideal value corresponding to perfect uniformity of thickness of the specimen.

In consideration of a number of possible means for applying stress to the surface of a specimen, it was finally concluded that the most appropriate would be a method wherein the desired stress would result from a rapid rate of shear in a viscous film, the shear occurring instantly after application of the film to the surface of the specimen. This principle appeared to have the following advantages over existing methods: (a) Stress may be applied through a thin film on a cylinder in a manner exactly similar to the establishment of the stress causing "picking" or surface failure in high-speed printing; (b) the viscosity of the film is normally so great, and the time of contact before rupture so short, that no appreciable penetration of the viscous fluid into the specimen may occur; (c) the test does not necessitate change in temperature of the sheet, and is therefore free of faults associated with temperature change, such as modification or redistribution of moisture content, and possible structural change; (d) the hydraulic tensile stress should not involve localized stress intensification at edges, as in ordinary tensile failure, nor should this fluid-transmitted stress exhibit strong nonuniformities because of variations in thickness, as discussed above. Some variation in stress caused by nonuniform thickness is to be expected, even when the stress originates in, and is transmitted by a fluid, although spurious effects because of this cause are expected to be small and similar to those occurring in actual printing.

Apparatus

Theory

When a cylinder covered with a thin film of a viscous fluid is rolled over a surface, part of the fluid remains behind on the surface. In the horn angle ahead of the "nip," the pressure in the fluid is above that of the atmosphere, but in the region behind the nip the nature of the fluid motion and shearing is such as to greatly reduce the pressure. In fact, in most cases of interest, the pressure changes sign—that is, a tensile stress exists in the fluid. If the rate of shear, in the fluid is sufficiently great, and if both the cohesive and adhesive strengths are large enough, the surface of the specimen, or combination of surface and body stock, will be removed. The tensile stress applied to the surface of the specimen will depend upon a number of factors, all of which can be controlled: (a) diameter of the cylinder; (b) load per linear inch of contact; (c) the thickness of applied film; (d) viscosity of the fluid; and (e) speed of the cylinder (which determines, with other quantities, the rate of shear in the viscous fluid).

With the first four factors listed above held constant, the tensile stress will vary from zero at zero speed in increasing manner with increasing speed. With a given specimen under the cylinder there should be a critical speed, above which the tensile stress is sufficient to cause surface or body failure of the specimen, and below which no failure occurs in the specimen. Similarly, if the viscosity is the only factor permitted to vary, the tensile stress should increase with increasing viscosity and, for a given speed, rupture should occur for all viscosities above a critical value. On the basis of dimensional analysis, it is believed that the tensile stress should vary in proportion with the mathematical product, uv = (viscosity) × (speed), provided that turbulence in the horn angle behind the nip is negligible, which appears to be a very reasonable assumption in the case of extremely viscous fluids.

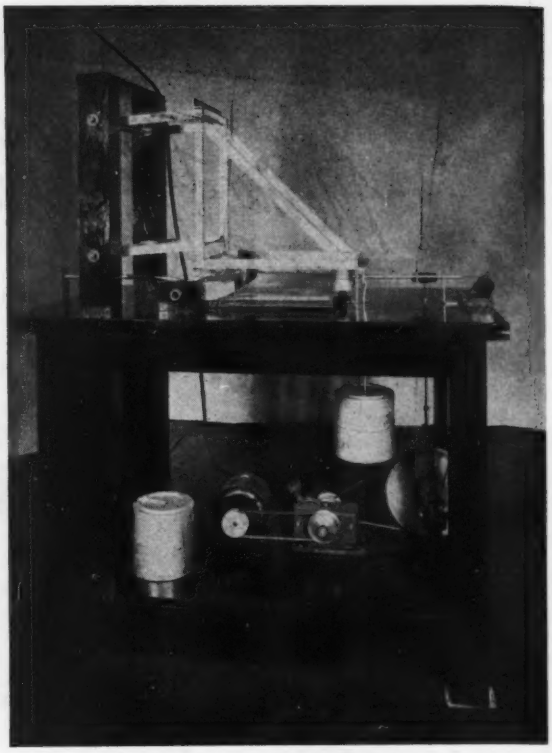


FIG. 1
The Assembled Instrument

The theory and the method have been explored with the equipment described in the following paragraphs.

The Instrument

A cylinder may be placed in moving contact with a specimen in either a linear or rotary manner. Although the latter arrangement (of two cylinders in contact) is usually the neater, apparatus which could be easily modified to provide a linear motion of the cylinder axis was already available and, hence, the equipment was built around this apparatus as a nucleus.

A photograph of the apparatus is shown in Fig. 1 (the wheels are shown in the lifted position), and drawings giving side and front views are presented in Fig. 2 (in which certain parts of the apparatus are not shown in order to make the general structure clearer). With reference to Fig. 2, a pair of solid steel 4-inch wheels having finely ground cylindrical surfaces (1) are caused to roll over two specimens mounted on very thick plate-glass tracks (2). The steel wheels are carried on a shaft which engages at its ends a pair of inverted tracks (3) through simple ball bearings, which are used as wheels. The inverted tracks serve to place the wheels under a substantial and controllable load. Because of slight flexing of the shaft under this load, it is necessary to so shim the plate-glass tracks, which rest on 0.25-inch slabs of soft rubber, that the wheels produce uniform nip pressure. Testing of this shimming is done by in-

The BROUGHTON

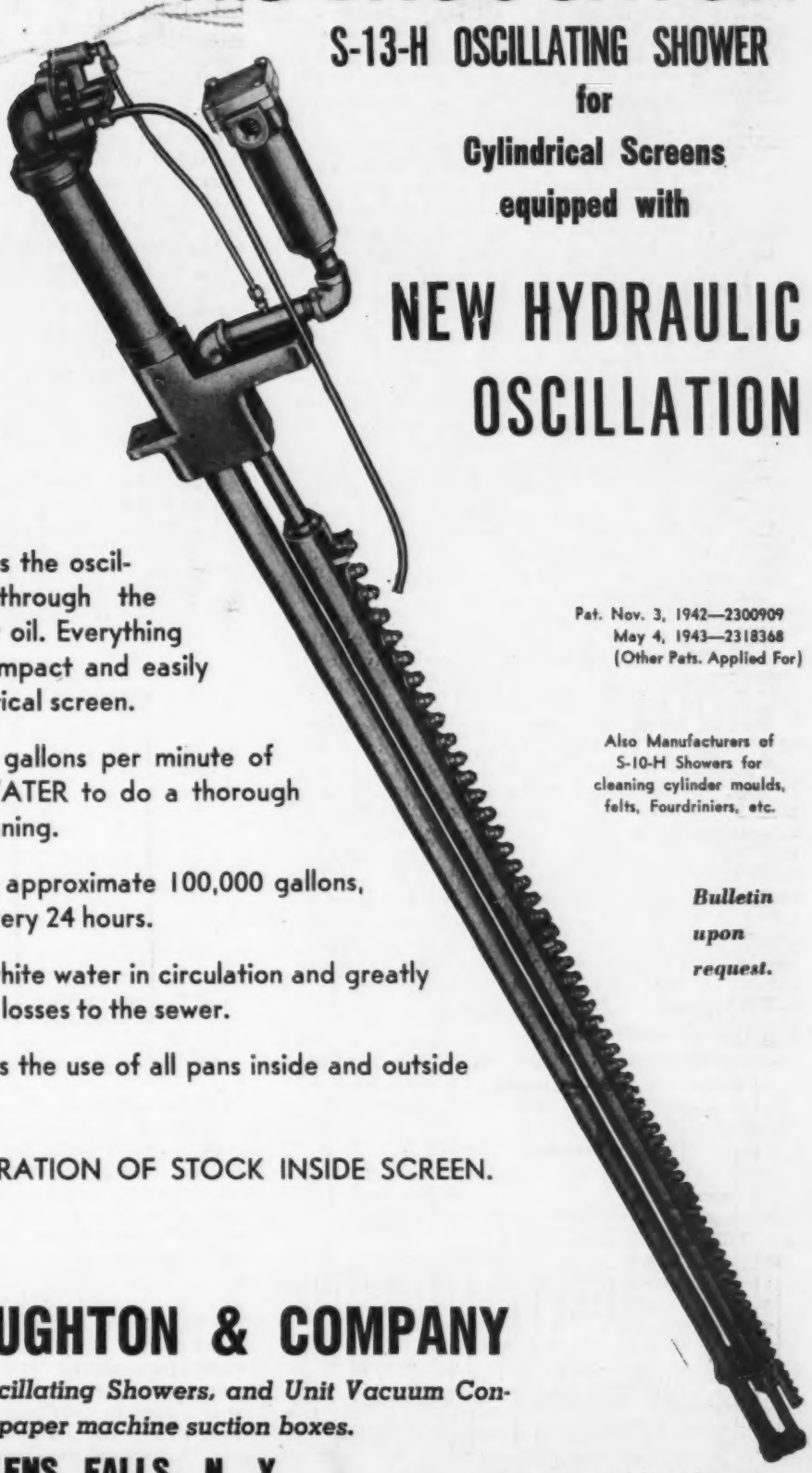
S-13-H OSCILLATING SHOWER

for

Cylindrical Screens

equipped with

NEW HYDRAULIC OSCILLATION



The same water drives the oscillator that passes through the shower. No grease or oil. Everything water lubricated. Compact and easily installed in any cylindrical screen.

Requires less than 5 gallons per minute of FRESH, FILTERED WATER to do a thorough job of continuous cleaning.

Savings in many mills approximate 100,000 gallons, and more, of water every 24 hours.

Decreases the total white water in circulation and greatly lowers stock and heat losses to the sewer.

Completely eliminates the use of all pans inside and outside the screens.

REDUCES ADULTERATION OF STOCK INSIDE SCREEN.

Pat. Nov. 3, 1942—2300909
May 4, 1943—2318368
(Other Pats. Applied For)

Also Manufacturers of S-10-H Showers for cleaning cylinder moulds, felts, Fourdriniers, etc.

Bulletin upon request.

A. E. BROUGHTON & COMPANY

Manufacturers of Oscillating Showers, and Unit Vacuum Controls for paper machine suction boxes.

GLENS FALLS, N. Y.

serting specimens of thin, uniform paper like greaseproof paper and examining the uniformity of the strips calendered by the passage of the wheels.

The steel wheels are set in motion by means of a flexible steel cable (4), which makes 2.5 or 3.5 turns about a motor-driven 1-inch shaft (5). This shaft is coupled by means of a speed-changing mechanism (6) to a motor (7). Any speed between 20 and 314 cm./sec. may be imparted to the pair of wheels by this mechanism. When it is desired to move the wheels over the specimens at any desired speed, the shaft (5) is set into rotation at the proper angular speed, and the operator pulls the ring (8) vertically up. (A slight tension in the cable leaving the shaft will control a large tension in the cable moving on to the shaft.) A stop (9) automatically limits the distance through which the pair of wheels is pulled. Rubber bumpers stop the wheels at the desired point.

When the wheels are returned by hand to the starting position they, and the inverted track system, may be lifted with the help of the lifters (10) and the lever (11). A simple catch at the end of the lever permits leaving the wheels and track system in the raised position. The lifters automatically align the wheels for the next passage over the specimens. When the wheels are in the raised position, the electrical speed meter (to be discussed later) is automatically primed for the ensuing speed determination, and the glass-plate tracks may be removed for the mounting upon them of new specimens, or simply be shifted to one side to permit the passage of the wheels over fresh areas. When the next run is to be made, the catch at the end of the lever (11) is released, the wheels are lowered, and the ring (8) is sharply raised. The specimens and the surfaces of the wheels are then inspected for evidences of failure of the former.

Load on the wheels is due primarily to the changeable weights (12), which are suspended from the inverted track system by means of a rod (13). It will be seen that the design of the track system is such that the downward load exerted upon the wheels is independent of the position of the wheels; the tracks may move only parallel to themselves. The total load upon the pair of specimens (which is at once the load per linear inch of contact, since each wheel is 0.50 inch wide) is equal to the total weight of the wheels, shaft, bearings, track system, weight holder, weights, and *half* the weight of the four horizontal links (14). This total load may be varied from 19.5 to 129.5 pounds in 27.5-pound steps.

Electrical Speed Meter

The measurement of the speed of the wheels as they

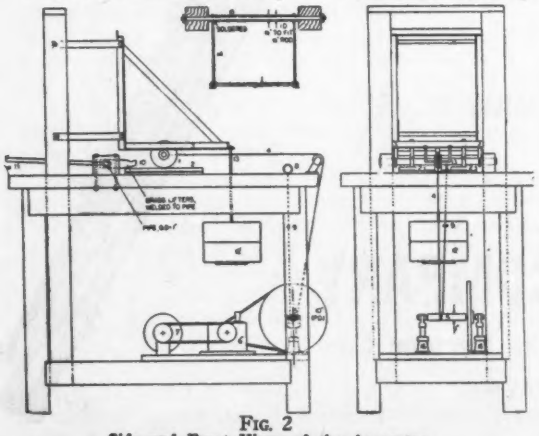


Fig. 2
Side and Front Views of the Apparatus

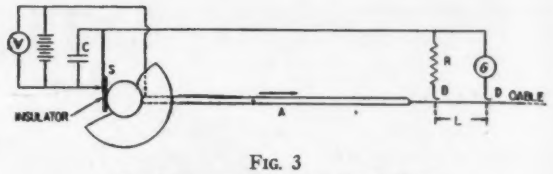


Fig. 3
Circuit Diagram for Electric Speed Meter

traverse the middle portion of the specimens is accomplished by means of a nearly forgotten method based on the exact laws of charge and discharge of an electrical condenser through a known resistance *(1, 2)*. The wiring diagram for this method as applied to the problem at hand is given in Fig. 3. The member A is a brass rod connected through a ball bearing to the center of the shaft on which the wheels (1) are mounted and forms a link between the shaft and the cable. (4 of Fig. 2.) When the wheels pass over the central region of the specimens, electrical contact between this rod and the contactors B and D is made. If the time interval measured by the equipment is t and the distance between the contactors is L the average speed over the interval is obviously $v = L/t$.

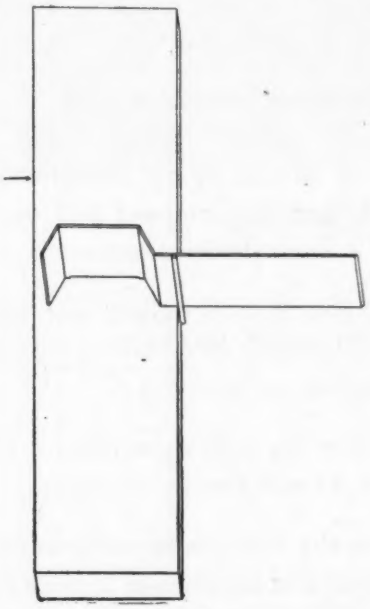


Fig. 4
Tool for Forming a Film of Mounting Cement

With the wheels and the rod A at the extreme left, the condenser C is maintained in discharged condition by means of the tapkey switch S, which engages the center of the shaft through an excellent electrical insulator. (This switch is opened when the pair of wheels is set into motion.) From the moment that contact is made at B, the charge in the condenser increases with time in accordance with the well-known law

$$Q = Q_0 (1 - e^{-t/RC}), \qquad (1)$$

where Q is the instantaneous charge, Q_0 is the final limiting charge, R is the resistance of a wire-wound resistor (1 megohm), C is the capacitance of a standard mica condenser (0.125 microfarad), and e is the base of Naperian logarithms. When the rod A makes contact with D the remaining quantity of electricity, $Q_0 - Q$, required to bring the potential across the condenser to that of the battery V, passes nearly in-

stantly through the galvanometer G. Although most accurate data may be obtained with a ballistic galvanometer (that is, one with a long period of oscillation), sufficient accuracy may be obtained with an ordinary galvanometer of adequate sensitivity. Noting that the ballistic deflection or "throw" of a galvanometer is proportional to the quantity of electricity passed through it, we have the deflection $d = k(Q_0 - Q)$, and, in particular, if all the charge passes through the galvanometer, which is accomplished by connecting A to D, with A free of contact with either S or B, $d_0 = Q_0$. Then, from Equation 1,

$$t = RC \ln [Q_0/(Q_0 - Q)] = RC \ln d_0/d \quad (2)$$

and

$$v = L/(RC \ln d_0/d) \quad (3)$$

With the voltage adjusted to give a standard deflection of the galvanometer, d_0, it is thus seen that there is a simple relation between the average speed v and the deflection d. Table I has been constructed on the basis of this relationship, so that an operator has only to observe the deflection and obtain from the table the speed in centimeters per second. The adjustment to the full deflection d_0 holds for a long period of time, and the method has been found very simple and reliable in use.

The successful use of the foregoing method is based on the use of a resistor of known resistance, a condenser of known capacitance, minimal residual charge, and high resistance, and insulating material of good quality. Where high insulation resistance was required in the existing arrangement, polystyrene has been employed.

Mounting of Specimens

It is required that the two specimens be mounted firmly and flatly upon the plate glass tracks. To accomplish this, a mixture consisting of 55% petroleum ether (b.p. 35-60° C.), 5% toluene, and 40% "3-M" Minnesota Mining Trim Cement has been used as an adhesive. When a film of this cement is formed on the glass and permitted to dry to the point where it is exceedingly tacky, the paper is held firmly, and it is believed that no penetration to the upper surface occurs. A tool for neat and rapid application of the cementing material to a glass plate is shown in Fig. 4. Slightly more of the material than actually required is poured on one end of the plate, and the tool is pulled lengthwise over the plate. The narrow slit between the tool and glass surface limits the original film thickness. After evaporation of the solvent to the point where the film is dry to the touch, the specimen is laid upon the adhesive film, and a rubber roll is rolled back and forth over the specimen to ensure good contact and adherence to the plate.

With the specimens mounted on the glass plates, the latter are placed on the instrument, and a test is performed.

(To be Continued)

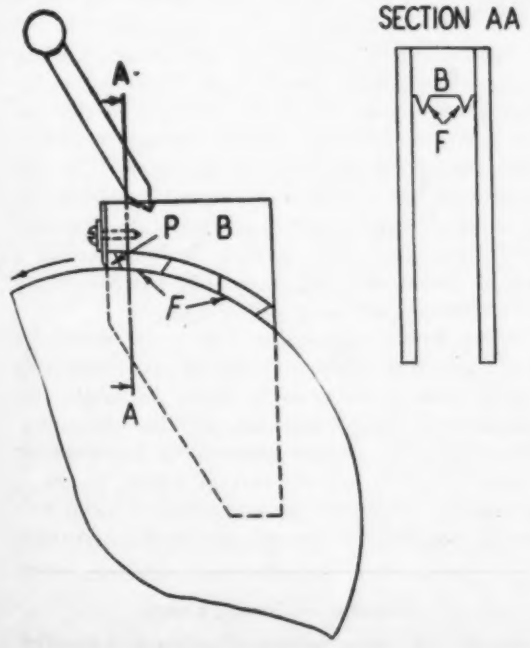


FIG. 5
Tool for Forming a Film of Viscous Oil on the Rims of the Wheels

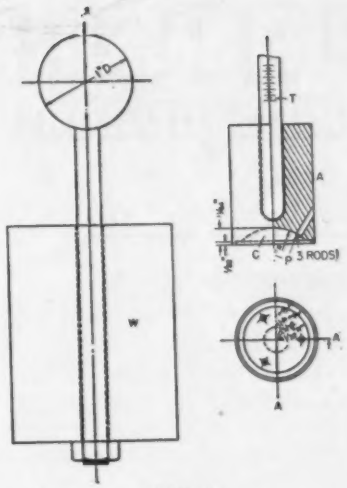


FIG. 6
Cup-and-Ball Viscometer

TABLE I.—RELATIONSHIP BETWEEN GALVANOMETER THROW AND SPEED

$d_0 = 100$ divisions; $RC = 0.125$ sec.

d (div.)	v (cm./sec.)	d (div.)	v (cm./sec.)
5	17.1		
6	18.2	46	66.0
7	19.3	47	67.9
8	20.3	48	69.9
9	21.3	49	71.8
10	22.3	50	73.9
11	23.2	51	76.1
12	24.2	52	78.4
13	25.1	53	80.7
14	26.1	54	83.2
15	27.0	55	85.8
16	28.0	56	88.3
17	28.9	57	91.2
18	29.9	58	94.1
19	30.9	59	97.1
20	31.9	60	100
21	32.9	61	103
22	33.9	62	107
23	34.9	63	111
24	35.9	64	115
25	37.0	65	119
26	38.1	66	123
27	39.1	67	128
28	40.3	68	133
29	41.4	69	138
30	42.6	70	144
31	43.8	71	150
32	45.0	72	156
33	46.2	73	163
34	47.5	74	170
35	48.8	75	178
36	50.2	76	187
37	51.5	77	196
38	53.0	78	206
39	54.4	79	217
40	55.9	80	230
41	57.5	81	243
42	59.1	82	258
43	60.7	83	275
44	62.4	84	293
45	64.2	85	315

PAPER TRADE JOURNAL

Title Reg. U. S. Pat. Off.

W. L. Cook, Editor

Foreign Trade and Paper

A thoughtful balanced plea for consideration of world markets was contained in the arguments lately addressed by T. D. O'Keefe of the Office of International Trade of the Department of Commerce to members of the Book Paper Manufacturers group. Admittedly a proponent of exports, but soundly required to base his reasoning on substantial facts because of present insistent domestic demand, the speaker showed how there is vastly more to the question of exports than simply shipping a few thousand tons of paper to a foreign customer. He showed, among other things, how a substantial portion of the paper industry relies on sources abroad for some of its more important materials, and how the economy of those countries benefits by exporting those materials to these borders. He also showed that there have been periods when the economy of this country was promoted by its ability to ship to foreign markets. He urged, reasonably, that efforts might wisely be made to cultivate and continue the good will abroad which at other times is so helpful to the ability of mills to serve their domestic markets.

In years gone by, the speaker declared, the paper industry has operated at less than eighty percent of capacity more often than above that figure. The industry's perennial problem has been development of markets.

It is true that today paper manufacturers can sell all the paper they are able to make almost within the shadow of their smokestacks. They could do the same thing in 1919 and 1920, when much the same circumstances existed. But in the 1930's markets melted like snow before a chinook wind. This can undoubtedly happen again.

World markets have long been important to the domestic paper manufacturer. First of all, exports of paper, paperboard and products have ranged from 221,000 tons in 1937 to 459,000 tons in 1945. But in addition to this significant tonnage of direct paper exports, there is a tremendous tonnage involved indirectly in the exportation of all other commodities and services—in packaging export goods, in commercial correspondence, in export of printed matter, and in numerous other indirect ways.

For instance, even though we were short of meeting full paper requirements in the United States in 1945, we consumed nearly 20 million tons when our gross national product totaled about 197 billion dollars, a ratio of about 100,000 tons of paper for every billion dollars of gross national product. Already the growing mechanization of the world has been profitable for us and in terms of annual rates United States exports are now approaching ten billion dollars yearly. Assuming that the ratio of paper use in exportation of goods and services is the same as in domestic trade, the current total export trade of the United States would account roughly for a consumption of about 1,000,000 tons of paper on an annual basis. Even though we did not export a single sheet of paper as paper itself, the pulp and paper industry must recognize the important role of all exports of other manufacturers as a consumer of its products.

The paper industry has still another vital interest in international trade. On the import side, this country brings in from foreign sources nearly two-thirds of the wood pulp purchased by domestic paper mills and about three-quarters of all newsprint used in the United States, together with smaller quantities of other items. Total imports of papermaking materials and paper amounted to $256,000,000 in 1939. On the basis of present volumes and prices the comparable value is much greater.

Well over half of our paper manufacturers look to Canada and northern Europe for wood pulp. Many others look to England for China clay, to the Dutch East Indies for amorphous wax and rubber, to Argentina for casein, and to numerous other countries for manufacturing and operating supplies. In fact, the value of all imports of papermaking materials, paper, paper products, and operating and manufacturing supplies for papermaking exceeded, month after month in prewar years, the value of comparable imports in any other commodity field in which domestic production is substantial.

American paper producers, the government expert declared, have tended to be interested in export markets only when the domestic market has not been able to absorb enough tonnage to support mill operation at the "break even" point. A trade based upon such policies he argued cannot be dependable. Foreign trade, particularly in consumer goods, must rest upon the same basis of continuity and service as domestic trade. The possibilities for such a development are excellent now.

Practical observations alone lead to the inescapable conclusion that foreign demands are increasing rapidly. The introduction of mass production, the expansion of local production, and the reorganization of domestic economy are creating a demand for greater quantities of all sorts of paper. Increased knowledge with regard to sanitation and social welfare is resulting in foreign governments insisting

Calendar of Coming Events

November 7-8, 1946—National Paperboard Association Annual Meeting, The Waldorf-Astoria, New York City.

upon improved handling of food products, which, among other things, depends upon better packaging.

In all countries education is receiving greater attention than ever before with a consequent sizeable increase in the demand for printing papers, as well as books and magazines published in the United States. In Mexico, for example, current law requires every adult citizen who is capable of reading and writing to assume the responsibility of teaching at least one other person to read and write. Social advancement is apparent in many countries and, together with broad programs of industrialization, will result in still greater paper requirements.

The world situation with respect to pulp and paper is entirely different now than it was in 1920. The outlook for international trade in general is brighter. We hope that the one element of the disastrous competition of a quarter century ago, unstable exchanges and depreciated currencies, will not again adversely affect foreign trade. The relative world supply-demand picture for pulp and paper has definitely changed. The possibilities of increased paper supplies for export from the European areas as a whole are remote. In fact, it is probable that the residual tonnage of paper available for export from Europe will constantly diminish.

The Department of Commerce is seeking closer cooperation and understanding with the industry both in domestic and foreign trade matters. We are now in the process of setting up advisory committees, both in the domestic and foreign fields. It was expected that a meeting of the domestic group, known as the pulp and paper industry council to the Department of Commerce, will be held before the close of October.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1946		Corresponding Weeks—1945	
September 14	105.1	September 15	94.0
September 21	105.8	September 22	94.3
September 28	106.6	September 29	98.1
October 5	107.2	October 6	94.1
October 12	105.9	October 13	96.2
October 19	*105.1*	October 20	96.5

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Avg.
1945	86.7	89.4	90.2	88.1	89.8	91.2	80.8	88.6	90.2	95.9	95.5	91.0	89.7
1946	94.7	98.4	104.4	102.7	100.7	104.6	94.0	104.7	*101.3*				

COMPARATIVE YEARLY SUMMARIES

	1939	1940	1941	1942	1943	1944	1945	1946
Year to Date	80.9	86.1	95.9	92.0	88.3	88.2	88.8	*100.8*
Year Average	83.4	85.6	97.4	90.4	87.8	88.1	89.7	

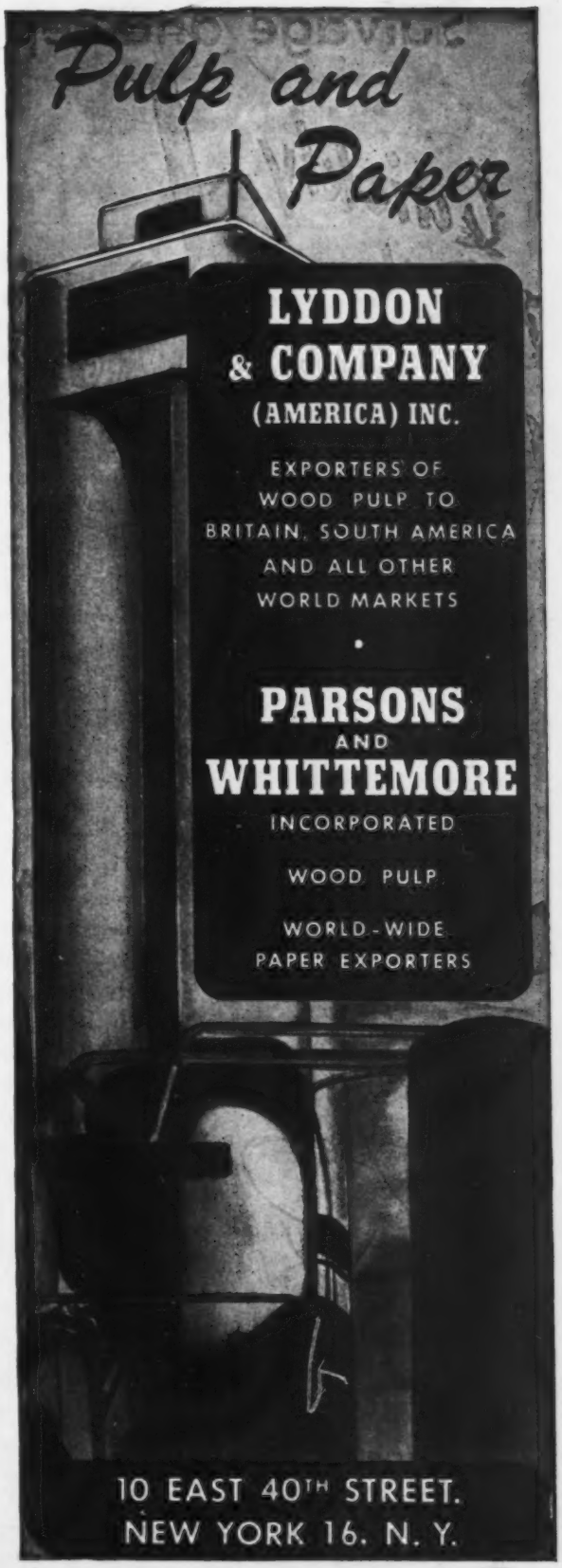
PAPERBOARD OPERATING RATIOS†

Current Weeks—1946		Corresponding Weeks—1945	
September 14	101	September 15	96
September 21	100	September 22	93
September 28	101	September 29	96
October 5	100	October 6	95
October 12	99	October 13	97
October 19	*98*	October 20	96

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Avg.
1945	91	95	97	97	96	96	86	90	91	97	95	85	93
1946	90	97	100	99	94	97	89	99	*96*				

* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.



Salvage and repair cast iron parts

Quickly Easily with

Repair crews say Ni-Rod is the smoothest-handling electrode they've ever used for welding cast iron.

With it, they get strong welds . . . sound welds . . . machinable welds.

. . . and they have an easy time getting them!

Ni-Rod has such excellent flow characteristics that slight variations in manipulation of the electrode have little effect on weld quality. Smooth, even deposits are readily applied in all positions — down-hand, vertical or overhead. No "special treatment" is needed; preheating is seldom required.

Broken or worn castings — even those in awkward, hard-to-get-at spots — are frequently repaired without dismantling equipment, thus saving time and labor, as well as preventing serious production delays.

You'll find plenty of jobs in your mill for Ni-Rod. This all-purpose electrode works equally well on either A.C. or D.C. It's available in diameters of 1/8", 5/32" and 3/16" from the distributors listed below.

Order a 5-pound package of Ni-Rod for use by your repair crew on all cast iron welding work where strong, sound, machinable welds are essential.

Send for Free Instruction Booklet

THE INTERNATIONAL NICKEL COMPANY, INC.

67 WALL STREET, NEW YORK 5, N. Y.

NI-ROD IS DISTRIBUTED BY:

WHITEHEAD METAL PRODUCTS COMPANY, INC., Baltimore, Boston, Buffalo, Newark, New York, Philadelphia, Syracuse

WILLIAMS AND COMPANY, INC., Cincinnati, Cleveland, Columbus, Pittsburgh, Toledo

STEEL SALES CORP., Chicago, Detroit, Indianapolis, Milwaukee, Minneapolis, St. Louis

PACIFIC METALS COMPANY, LTD., Los Angeles, San Francisco

J. M. TULL METAL & SUPPLY CO., Atlanta

EAGLE METALS CO., Portland, Seattle

METAL GOODS CORPORATION, Dallas, Houston, New Orleans, Tulsa

HENDRIE & BOLTHOFF M & S CO., Denver

ROBERT W. BARTRAM, Montreal

ALLOY METAL SALES, LTD., Toronto

WILKINSON COMPANY, LTD., Vancouver

METAL & THERMIT CORPORATION*

HOLLUP CORPORATION*

NATIONAL CYLINDER GAS COMPANY*

*Offices in principal cities

Section of the
TECHNICAL ASSOCIATION
OF THE PULP & PAPER INDUSTRY
122 E. 42nd St., New York 17, N. Y.
Edited by R. G. Macdonald, Secretary

Collector for Sulphate Soap*

By W. P. Thielens[1] and Robert R. Fuller[2]

The collection of sulphate soap is discussed covering points of collection and systems. A collector is described and yields are given.

The recovery of useful products from the black liquor in pulp mills has long intrigued the paper industry and resulted in considerable research on the subject. From this research among other items, the product tall oil has developed into commercial importance. It has been produced in Sweden and used as a source of fats abroad for a long time. In this country tall oil has been produced for sometime; but it has only recently come into commercial prominence. To produce tall oil the mill must first separate the sulphate soap (mixed sodium salts of the resin and fatty acids of the wood) from the black liquor to obtain the raw material for making tall oil. Indications are that the black liquor of a mill operating on loblolly pine contains from 180 to 200 pounds of sulphate soap per ton of finished paper. Apparently, operations using long leaf have more soap per ton of paper. The soap as collected contains approximately 50% resins and fatty acids with the balance being made up of water and sodium.

Soap Collection

As soon as black liquor starts to cool or its total solids content is increased the sulphate soap starts to salt out to the top of the container holding the liquor provided there is no agitation. Where conditions are excessively foamy, the foam will contain a large percentage of soap. The soap, therefore, has been collected at numerous points in the black liquor handling system and a number of mills have experimented to find the most efficient point for taking out the soap.

[1] Chief Engineer, Gulf States Paper Corp.
[2] Chief Chemist, Gulf States Paper Corp.
* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 25-28, 1946.

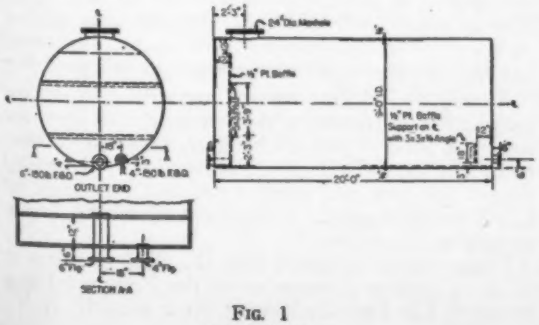


FIG. 1
Soap Collector.

At first the soap was taken from the black liquor storage tanks, where it separates out because of temperature change and agitation. Soap separated at this point is quite foamy and some means of separating the entrapped air had to be used. One system for collecting soap at this point pulled the foam from the top of the tank through a cycloidal blower which discharged it into a screw conveyor having perforated sides to let the black liquor drain from the soap.

As only a small portion of the soap can be collected at the storage tanks other points of collection in the liquor system were considered. Probably all mills now producing soap have tried points all through the evaporators and after the evaporators. The most satisfactory point generally agreed upon seems to be between 20 and 30% total solids (first expressed by West Virginia Pulp and Paper) which in a quintuple, long tube evaporator is between effect two and three. A number of systems are in use for collecting soap at this point, but all of them are essentially a storage system to allow the soap time enough to collect to the top of the liquor and a means of skimming the soap

FIG. 2
Soap Collector.

off. They vary in the elaborateness of control, and the complexity of storage. Some are mounted at the evaporator base, and others at a considerable distance from the evaporators. Liquor output and input to the separator is carefully metered in some instances, and in others is left to hand control by the operators. Collectors at this point recover from 100 to 180 pounds of soap per ton of paper depending somewhat on the type of wood used. Perhaps the best system proposed to date is the one outlined in the paper by Pollack and others in the 1943 Technical Association Papers.

Gulf States Unit

The separator developed at the Gulf States plant operates between the third and second effect of a quintuple, long tube evaporator on liquor containing between 20 and 25% total solids. It consists of a standard 9 foot diameter by 20 feet long, flat end tank of ⅜-inch thick plate. A bulk head is installed of ½-inch plate 1 foot from the end of the tank. This bulk head at the top is stopped short of the complete

diameter by 1 foot, thereby, forming a weir over which the soap can flow. This also forms a collection compartment for soap. A liquor compartment is formed back of the bulk head 19 feet long and 8 feet deep along the vertical centerline of the tank. Liquor from No. 3 effect is brought in the rear of the tank at the bottom. A narrow distributing baffle covers this inlet about a foot from the back of the tank. Liquor flows from the tank through an outlet on the front in the bottom extending through the bulk head, into a two compartment level control box with an adjustable baffle between compartments. From this box it flows through a float operated butterfly valve into the intake of the No. 2 effect feed pump. As long as the distance from the top of the tank to the bottom of No. 3 vapor head exceeds the equivalent vacuum on No. 3, the liquor from No. 3 will flow into and through the collector, through the flow box to the No. 2 pump. There is no need for meters, extra pumps, or other controls. The baffle between compartments in the flow box must be adjusted so that soap just flows over the bulk head of the separator into the soap compartment. For a decrease in feed of 5,000 gallons per hour to the evaporators the baffle in the level control must be lowered about 2 inches. A bypass is installed between the inlet and outlet of the flow box so the collector can be drained. Another bypass is installed between the inlet to the collector

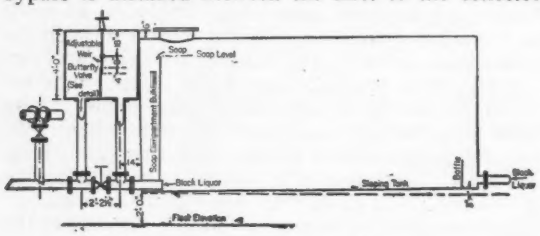


FIG. 3
Soap Collector. Section-Elevation.

and the outlet of the flow box so the whole soap collecting system can be bypassed by closing two valves, and opening one. These valves are all placed quite close together so they can be operated rapidly by the operator. Otherwise, level is lost in the collector and the No. 2 effect is flooded.

Soap is pumped continuously from the soap compartment by a 2-inch common gear pump driven by a 3 h.p. 1750 r.p.m. motor with a 33 to 1 gear reducer, through 400 feet of 3-inch line containing five right angle changes of direction to storage. A 1½-inch pump failed to move the soap satisfactorily. A ¼-inch steam line is tapped in just after the pump to blow out the line. This is occasionally necessary. Soap flow at this point will not exceed 5 g.p.m. for a 250 ton mill. Collections in pounds per ton of paper have averaged since installation in January 1945 respectively by month: 73.02, 150.02, 174.74, 177.81, 112.38, 142.38, 140.52, 95.68, 110.96, 105.64, 115.71, and 118.20. It is not known whether variations are caused by wood, liquor, or evaporator troubles.

Collection After Evaporators

Sulphate soap can also be satisfactorily collected after the evaporators. Apparently, collecting in the evaporator system is preferred because there seems less soda loss with the soap; removing soap improves evaporator operation and capacity, and liquor free of soap handles better. It seems to be better practice to separate out the soap, even if it is to be burned later,

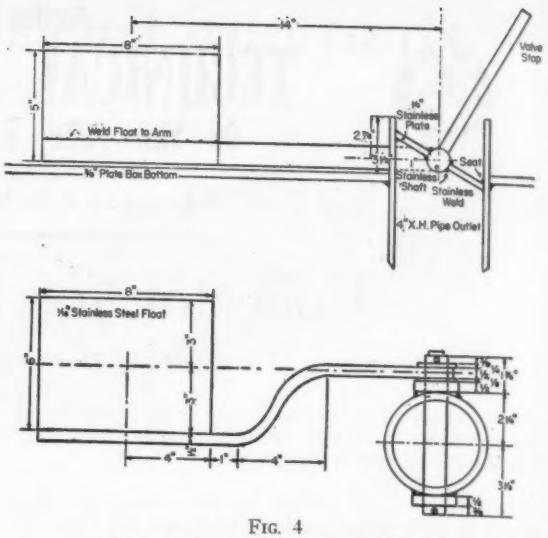


FIG. 4
Butterfly Valve and Float. Soap Collector.

and separately fire it through a special nozzle into the recovery furnace. As far as separation of soap is concerned, more soap would probably be collected from the liquor after the evaporators. The separator in the evaporator system does not remove all the soap. Soap collected after the evaporators is denser and darker colored, but otherwise seems no different from that collected in the evaporator system. Probably the greatest drawback to collection after the evaporators is the fact that liquor leaving the first effect is generally under pressure and is somewhat superheated. If this liquor is discharged into a collection tank at atmospheric pressure, it flashes keeping the liquor stirred up and the soap mixed with it in pasty masses. Such liquor handles poorly, and gives trouble at the sprays. To avoid this it is necessary to flash the liquor as it enters the separator. A surge tank should be provided between the separator and the next liquor processing step. Flow control of the entire liquor system is somewhat more difficult if the collection system is after the evaporators.

Water Treatment and Purification

The second edition of Water Treatment and Purification by William J. Ryan has been issued by the McGraw-Hill Book Company (270 pp. 5½x8½). Its purpose is to make available to engineers, plant managers, students and technical men a description of the several purification and other processes that are applied to water, especially those that have come into operation since 1937. A relatively large amount of space is devoted to boiler feed water. The author has had seventeen years experience in this field.

Among the subjects covered are sedimentation and coagulation, filtration, water analysis, the lime and soda ash process, ion exchangers, boiler feed-water treatment, tastes and odors, prevention of corrosion removal of iron and manganese, and prevention of boiled embrittlement. A number of selected bibliographies are included.

Copies may be obtained from the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd Street, New York 17, N. Y., at $2.75 per copy.

Comparative Estimations of Carbonyl and Carboxyl Groups in Chromium Trioxide and Hypochlorous Acid Oxycelluloses and Oxyxylans*

By Boonyium Meesook[1] and C. B. Purves[2]

Abstract

The method of estimating carboxylic acid groups by the displacement of silver from a solution of silver ortho-nitrophenolate,

$$RCOOH + AgO \cdot C_6H_4 \cdot NO_2 \rightarrow RCOOAg + HO \cdot C_6H_4 \cdot NO_2$$

was compared with that depending upon the displacement of acetic acid from a solution of calcium acetate. Acidic, chromium trioxide and hypochlorite oxycelluloses and oxyxylans were used in the comparison. The former method required about 3 days, and the latter about 1 day, at 25°C. for completion and with these times the methods checked each other within ± 3% for chromium trioxide oxycelluloses. Although a sharp end-point in the final titration made the silver o-nitrophenolate technique greatly to be preferred when the number of acidic groups was very small, as in technical products, the reagent was sometimes reduced to metallic silver by hypochlorite oxycelluloses. The calcium acetate method did not have this uncertainty and was adopted for oxycelluloses containing reducing groups.

Condensation of the carbonyl, or carbonyl plus carboxyl groups, in similar oxycelluloses with methylhydroxylamine hydrochloride solution was studied. This reagent differed from the hydroxylamine hydrochloride solution previously used in being stable for days instead of hours. The condensations

$$R_2CO + H_2NOCH_3 \cdot HCl \rightarrow R_2C = NOCH_3 + H_2O + HCl$$
$$RCOOH + H_2NOCH_3 \cdot HCl \rightarrow RCOOH \cdot H_2NOCH_3 + HCl$$

were about 95% complete within 1 day at 25°C., and after this time the results checked those obtained by the 1.5 hour hydroxylamine method within ± 3%. Since the validity of the latter method for the determination of carbonyl was upheld, considerations of cost and rapidity made it preferred in cases where prolonged rate studies of the condensation were not required.

Oxycelluloses averaging about 0.04 moles of carboxyl and 0.052 moles of carbonyl per glucose unit could be reliably prepared in quantitative yield and in 20 minutes by the expenditure of 0.15 atoms of oxygen from a chromium trioxide-acetic acid-acetic anhydride oxidizing solution. These figures corresponded to an oxygen recovery of about 90% and were considered to check the reliability of the calcium acetate, hydroxylamine and methyl hydroxylamine estimations. Reoxidation of such oxycelluloses with chlorous acid presumably converted all aldehyde to carboxyl, but left unchanged all ketone groups. Analyses of the reoxidized product suggested that the original 0.052 moles of carbonyl consisted of 0.29 to 0.39 moles of aldehyde and 0.18 to 0.28 moles of ketone groups.

Oxycelluloses with 0.011 to 0.016 moles of carboxyl and 0.019 to 0.037 moles of carbonyl groups per glucose unit were prepared by the expenditure of 0.10 to 0.135 atoms of oxygen from aqueous hypochlorite at pH 3.4 to 6.0 and at 25°C. The oxidation took days, the yields were slightly less than quantitative and the recovery of oxidant was 35 to 55%. These hypochlorite oxycelluloses differed from the chromium trioxide oxycelluloses, oxidized to a comparable extent, in being very much more friable and in having a much greater tendency to disperse colloidally in water. The same difficulties arose in an extreme form in parallel chromium trioxide and hypochlorite oxidations of cottonseed-hull xylan, where the yields of oxyxylan were 91 and 83%, and the recoveries of oxidant were 52 and 19%, respectively. In the preparation of hypochlorite oxycellulose and of both types of oxyxylans, intense local oxidations leading to the production of water-soluble fractions apparently occurred.

The results described in an earlier article *(6)* strongly suggested that chromium trioxide dissolved in acetic acid-acetic anhydride first oxidized the more accessible portion of cellulose to oxycelluloses that were insoluble in water. The yield of oxycellulose, after washing with water, was practically quantitative. In accord with the assumption that the crystallite portion of the cellulose was impenetrable to the reagent, increasing amounts of the latter brought about a further, secondary oxidation of the accessible fraction to water-soluble substances, the loss of which during the isolation noticeably reduced the yield of oxycellulose. Previous swelling of the cellulose, or swelling during oxidation in an aqueous medium, delayed the onset of this secondary effect until an oxidation level of 0.2 to 0.3 atoms of oxygen per glucose residue had been attained. A consequence of these ideas was that the oxidant consumed should be quantitatively recovered in the insoluble product, as carbonyl and carboxyl groups, provided the amount of oxidant was restricted to not more than that necessary for the primary oxidation of the accessible cellulose. Even when this condition was fulfilled, however, the recovery never exceeded 75% of theory. This discrepancy suggested that the estimations used for carbonyl and carboxyl groups in the

* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 25-28, 1946.

[1] Member TAPPI; Research Associate, Massachusetts Institute of Technology (1942-43). Present address, Sandy Hill Iron and Brass Works, Hudson Falls, N. Y.

[2] Member TAPPI; Associate Professor of Organic Chemistry, Massachusetts Institute of Technology, Cambridge, Mass. Now E. B. Eddy Professor of Industrial and Cellulose Chemistry, McGill University, Montreal.

oxycelluloses were not as reliable as had been thought and required to be re-examined.

The carbonyl determination was based upon the condensation of this group with aqueous hydroxylamine hydrochloride, followed by the titration of the liberated hydrochloric acid.

$$= C = O + H_2NOH \cdot HCl \rightarrow = C = NOH + H_2O + HCl$$

Since the instability of the reagent made it advisable to limit the condensation to 1.5 hours, the possibility remained that this time was insufficient to allow the reaction to be completed, particularly if "slow reacting" carbonyls were present. Such estimations have now been compared with similar ones employing methylhydroxylamine hydrochloride, H_2NOCH_3.HCl, whose use in this connection was suggested by Dr. Edward K. Gladding. Since aqueous solutions of this salt are stable for several days in the conditions used, the condensation with carbonyl groups in oxycelluloses could be reliably followed for prolonged periods.

The estimation of carboxylic acid groups was by the displacement of acetic acid from aqueous calcium acetate, as described by Yackel and Kenyon *(20)*.

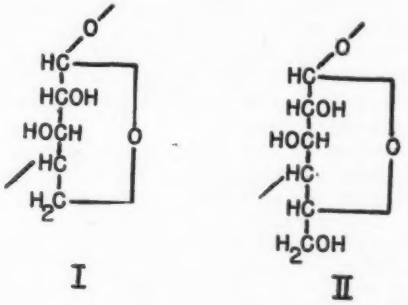
$$2\ RCOOH + Ca(OAc)_2 \rightarrow Ca(COOR)_2 \downarrow + 2\ HOAc$$

Similar use has been made of other salts *(11)* and the conditions in which the displacement is practically quantitative were discussed by Sookne and Harris *(16b)*. These authors permitted the carboxyl groups to remove silver from an aqueous solution of silver ortho-nitrophenolate,

$$- COOH + AgO \cdot C_6H_4 \cdot NO_2 \rightarrow - COOAg \downarrow + HO \cdot C_6H_4 \cdot NO_2$$

Since products esterified by diazomethane gave blank results for free carboxyl groups, the latter, and not some obscure absorption mechanism, were shown to be responsible for the removal of the silver ion from solution. Harris and his collaborators also estimated the small amounts of carboxylic acid associated with the pectins in dewaxed cotton by an improved determination of uronic acid carbon dioxide *(19)*. Electrodialysis of the cotton removed the molar equivalent of inorganic bases (cationic ash) and left an acidic, ash-free product *(15, 16a)*. The estimations of carboxyl groups in such products by the silver o-nitrophenolate and calcium acetate methods agreed both with each other, with the amount of cationic ash and with the uronic acid determinations *(16b)*. After estimating the aldehyde end-group content in a series of hydrocelluloses by selective oxidation with alkaline hypoiodite, the carboxylic acid units so formed were satisfactorily accounted for by the silver o-nitrophenolate method *(8)*. Finally, the oxidation of cellulose by periodic acid to a dialdehyde derivative was found to proceed almost quantitatively and a reoxidation of this product with chlorous acid gave the corresponding dicarboxylic acid derivative with no apparent side reactions. Estimation of the acidic groups with silver o-nitrophenolate then checked the number of aldehyde groups, determined by a modified hypoiodite method, and also the molar amount of periodic acid used in the original oxidation *(12)*. The value of chlorous acid as a quantitative, highly selective oxidant for hydroxy-aldehydes as opposed to hydroxy-ketones was demonstrated for simple aldo- and keto- sugars by Jeanes and Isbell *(7)*. These researches unite in establishing the silver o-nitrophenolate estimation as reliable to within ± 10% for nonreducing celluloses containing minute amounts of acidic groups. Substantial amounts of the latter would doubtless be determined with much greater accuracy.

The validity of the estimation for acidic products also containing reducing groups seems to have been investigated only by Elizer, who obtained a satisfactory correlation for certain oxystarches between the o-nitrophenolate and a similar method employing aqueous copper acetate *(5)*. The application of the uronic acid and calcium acetate methods to reducing, acidic, nitrogen dioxide oxycelluloses, however, gave somewhat divergent results *(20)*. In the present work, the acidic groups in reducing, chromium trioxide oxycelluloses were determined both by the o-nitrophenolate and calcium acetate methods. Technical improvements in the latter method, in conjunction with the estimation of carbonyl by hydroxylamine or methylhydroxylamine hydrochloride solutions, made it possible to account for about 90% of the oxidant used in preparing such oxycelluloses. With this reassurance about the validity of the two estimations, they were employed in a preliminary study of some hypochlorite oxycelluloses. Attempts were also made to differentiate between ketone and aldehyde groups in chromium trioxide products by the selective oxidation of aldehyde with excess aqueous sodium chlorite at pH 2.5 and 25°C. Another attempt to establish the same differentiation was based upon a private communication from Dr. E. C. Jahn. Dr. Jahn pointed out that the polysaccharide xylan (I) is in all probability a nearly linear macromolecule *(3)* that differs from cellulose (II) only in average chain length and in the lack of a primary alcohol group in the repeating unit. Since this lack renders unlikely the production of aldehyde groups when xylan is oxidized without degradation, parallel oxidations of



I II

xylan and cellulose might reveal, by difference, the number of aldehyde groups in the product from the latter. The rather indefinite results of two experiments based on this reasoning are recorded.

Preparation of Cellulose and Xylan

CELLULOSE.

The high-grade cotton linters, which were the gift of H. M. Spurlin and the Hercules Powder Company, were dewaxed, highly swollen in NaOH, washed, de-ashed with 0.1 *N* HCl or 10% acetic acid, and dried through solvent exchange exactly as previously described *(6)*. Samples destined for oxidations in glacial acetic acid were not dried but were solvent-exchanged from water into that liquid. The dry weight of the mass was assumed to be that found in a duplicate preparation by direct drying.

XYLAN.

Powdered, defatted cotton-seed hulls, the gift of the Perkins Oil Company, (2.5 kilos), were extracted at room temperature for 16 hours with 15 liters of 5% NaOH *(1)*. The supernatant liquors were partly decanted, partly filtered through linen cloth in a

very tedious operation and the residues were re-extracted with 10% NaOH. After another tedious decantation and filtration, the combined liquors, nearly black in color, were made slightly acid with 10% HCl. Xylan precipitated as a gray, swollen, dough-like mass, which was redissolved in 3% NaOH and reprecipitated with acid. At this stage the xylan dried to hard, very dark brown crumbs.

Some of these crumbs, 80 grams, were dissolved in a liter of 3% NaOH; the solution was centrifuged and the dark, supernatant liquor was filtered through sintered glass. A 0.97 *N* solution of sodium hypochlorite, 40 ml., was added and, after standing at room temperature overnight, the xylan was recovered by acidifying the liquor, adding 300 ml. of methanol and centrifuging. The alkaline bleach and the isolation were repeated. A final rapid bleach was carried out on the acid side by dissolving the xylan in 600 ml. of 3% NaOH, acidifying with acetic acid, and by adding the sodium hypochlorite solution, with vigorous stirring, till the slurry appeared quite white. After isolation, the product was suspended in 800 ml. of water at 0°C., 100 ml. of *N* HCl and 200 ml. of ethanol were added and after 30 minutes the slurry was centrifuged. This de-ashing treatment was twice repeated before the xylan in the centrifuge cups was washed repeatedly with *distilled* water till free of chloride ions. Drying was by solvent-exchange through 50, 80 and 100% methanol (latter treatment repeated three times), followed by four treatments with sodium-dried, redistilled benzene, and preservation *in vacuo* over phosphorus pentoxide and paraffin wax. The xylan was then a soft white powder, whose aqueous suspensions had a gelatinous quality that made them exceedingly difficult to centrifuge or filter. Suspensions in strong aqueous methanol or acetone also tended to be colloidal. The rather small yield of 24 to 28 grams was probably reduced to that amount by degradation during the preparation.

One sample (X-2) had a specific rotation at 20°C. (sodium light) of —90.0° in 3% caustic soda. Furfural determinations *(2)*, after correction for a 3.5% residue of dark, insoluble material (Body X *(1)*) and for uronic anhydride *(10)* showed the presence of 85.3 and 87.3% xylan. Estimations by the calcium acetate and the silver o-nitrophenolate methods both gave 0.0004 moles of carboxyl group per gram, corresponding to a glucuronic acid content of 0.0004 × 176 × 100 or 7%, or to 1 glucuronic acid unit for every 17.7 xylan units. All these measurements check those found by Anderson, Hechtman and Seeley *(1)* for the less soluble fraction A of cottonseed-hull xylan: body X, 0 to 7.3%; xylan, 85.5 to 90%; uronic acid, 7.46 to 8.33% and a specific rotation of —88.5° to —91.2° in 2% NaOH at 25°C.

A value of 0.000093 carbonyl groups per gram, or one carbonyl for 81 xylan units, was found by the hydroxylamine method for xylan X-2, but later estimations on other samples gave zero results.

A sample of xylan rendered ash-free by electrodialysis *(15)* was not employed because its appearance and colloidal behavior seemed abnormal.

Typical Oxidations

(a) With Chromium Trioxide.

The earlier procedure *(6)* was followed with some modifications. A mixture of 800 ml. of glacial acetic acid, redistilled from chromium trioxide, and 200 ml. of acetic anhydride was used to dissolve 1.985 gram of CrO_3. Dilute sulphuric acid and about 1 gram of solid potassium iodide was added to a 25 ml. aliquot and the liberated iodine was titrated with 0.089 *N* sodium thiosulphate. The calculated oxidizing equivalent of the solution was 0.0596 and that found by titration was 0.0599. The titration values were used because they automatically made allowance for occasional loss of oxidant caused by traces of reducing impurities in the solution. These impurities were quickly and spontaneously oxidized and thereafter the oxidizing power of the solution remained practically constant for hours.

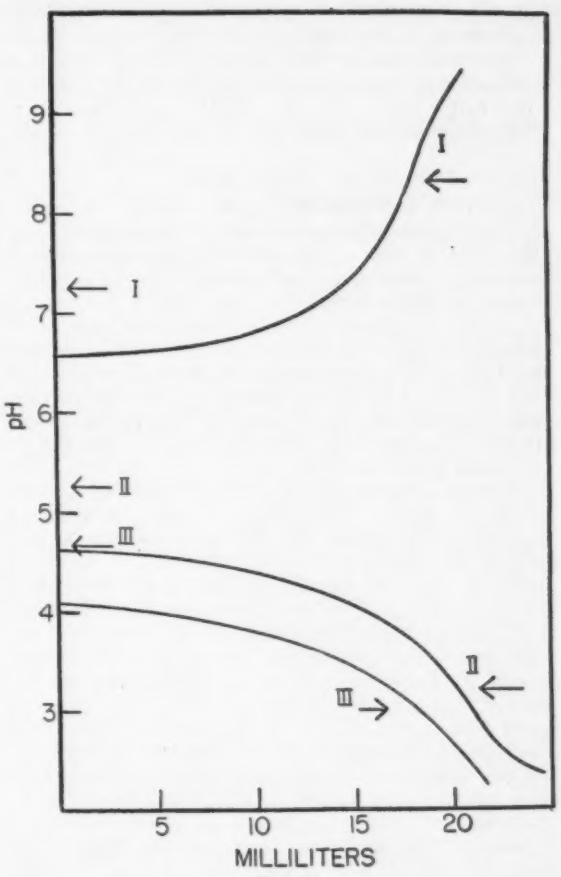


Fig. 1

Final Portions of Electrometric Plots of pH Against Milliliters of Added Acid or Alkali. Arrows to Left Indicate Initial pH; Those to Right End pH. Plot I, Calcium Acetate and Acidic Oxycellulose; Abscissa, Milliliters of 0.01 *N* NaOH. Plot II, Hydroxylamine Estimation of Carbonyl; Milliliters of 0.1 *N* HCl. Plot III, Methylhydroxylamine Estimation of Carbonyl; Milliliters of 0.1 *N* HCl.

Cotton linters, 21 gram or 19.8 gram dry, were swollen in alkali and solvent-exchanged to glacial acetic acid. The wet mass, 76 gram, was immersed, at 20 or 25°C., in 800 ml. of the above oxidizing solution and the temperature quickly rose by 2° or 3°C. in spite of slight external cooling. After 20 minutes, the oxycellulose was recovered by filtration and was washed with two lots of 10% acetic acid. Aliquots of the filtrate and washings, of volumes 700, 625, and 375 ml., were separately titrated, and together accounted for 0.0105 equivalents of oxidant. Therefore 0.0599 × 0.8 — 0.0105 or 0.0375 equivalents had been consumed. The oxycellulose was thoroughly de-ashed in 10% acetic acid for 2 hours, was recovered and re-extracted for 30 minutes. Solvent-exchange through methanol and benzene and final drying *in vacuo* followed. The yield varied from 99 to 103% by weight, without allowing for loss of traces of water-soluble degradation products, slight

gains by adsorption of chromium salts (0.2 to 0.3%) and by oxidation, and for any inaccuracies in the moisture determinations. Since 0.0375 equivalents of oxidant corresponded to 19.8 grams of dry cellulose, the oxidation amounted to $\frac{0.0375}{2} \times \frac{162}{19.8}$ or 0.15 atoms of oxygen per glucose unit.

(b) With Hypochlorous Acid.

High grade commercial sodium hypochlorite was dissolved in water and the oxidation equivalent of the solution was found to be 0.955 *N* by the arsenite-iodine titration method *(17)*. The titer of this strongly alkaline hypochlorite solution was unchanged after keeping in the dark at 20°C. for 3 months. Approximately 0.3 *M* sodium acetate-acetic acid buffers (pH 6.0, 5.3, and 3.4) were prepared to keep the hydrogen ion concentration nearly constant during the oxidations. Aliquots were made alkaline, of course, for the arsenite-iodine titrations.

Linters, 20 gram dry weight, were swollen, and the mass, containing 19.8 gram of cellulose and 49 ml. of water, was mixed with 90 ml. of the bleach, previously diluted to 2000 ml. by the acetate buffer of pH 6.0. More of the diluted bleach was kept as a blank, since its titer slowly decreased from 0.0426 *N* to 0.0310 *N* during the course of the oxidation. The difference between these and intermediate blanks, corrected by the dilution factor of 2049/2000, and the corresponding experimental titrations at any time gave the amount of oxidant consumed by the cellulose. After 120 hours at 20°C., the difference between 25 ml. aliquots of the corrected blank and the titration amounted to 3.0 ml. of 0.1 *N* arsenite solution. Assuming a base molar weight of 162 for the oxycellulose, the oxidation level of the latter was $\frac{3.0 \times 0.1}{2000} \times \frac{162}{19.8} \times \frac{2049}{25}$ or 0.10 atoms of oxygen per glucose unit. After recovery by filtration, the oxycellulose (CO-10) was washed in water, de-ashed by two 1 hour extractions with cold 0.1 *N* hydrochloric acid and washed till chloride-free with 10% acetic acid. Drying was through anhydrous methanol and benzene.

(c) With Chlorous Acid.

The sodium chlorite was 98% pure and was the gift of Dr. R. E. Gage and the Mathieson Alkali Company. A solution containing 11 grams in 200 ml. of water was buffered to pH 2.5 by the addition of 90 ml. of glacial acetic acid. Oxycellulose or oxyxylan, 11 grams, was added and oxidation proceeded for 1 hour at 25°C. The product while still on the filter was washed twice with water and was de-ashed by three extractions with 10% acetic acid. When the extracts became chloride-free, the product was dried through methanol and benzene.

(d) Oxidations of Xylan.

The procedures (a), (b) and (c) were applied without change to xylan, but the physical nature of this polysaccharide made recovery of the products less quantitative and more difficult. The oxyxylan was separated from the oxidation liquors by centrifuging and, in the case of hypochlorite products, traces of the bleach were removed by an extraction with dilute sodium sulphite solution. Three extractions in the centrifuge cup with much cold 0.04 *N* hydrochloric acid followed and chloride ion was subsequently removed by repeated washings with aqueous alcohol. Drying was through 70% and 100% methanol and finally through benzene. A 91% yield of xylan was recovered in an unoxidized state after the treatment with chlorous acid.

Estimations of Carboxyl and Carbonyl Groups

Calcium Acetate Method.

Yackel and Kenyon's technique *(20)* was followed with slight modifications. The C.P. acetate was dissolved in enough boiling water to make a 0.5 *N* solution, which was boiled for a few minutes before cooling, filtration and storage in a stoppered bottle. Samples of 0.2 gram to 0.5 gram of oxycellulose, xylan or oxyxylan were immersed in 60 ml. aliquots of the calcium acetate solution, whose initial pH was 7.2 to 7.5. Blanks were run. After the desired time, usually 24 hours, the mixtures were filtered and 50 ml. aliquots of the filtrate, together with 50 ml. volumes of the blanks, were titrated to pH 8.3 with 0.01 *N* or 0.02 *N* NaOH. A recently calibrated Beckmann pH meter was used in the titration, the final portion of which is reproduced in Fig. 1, plot I, to show the point of inflection at pH 8.3. If the pH during the experiment became more acid than 6.3, the estimation of carboxylic acid tended to be low, probably owing to incomplete formation of the oxycellulose calcium salt. This mishap was avoided either by repeating the estimation with a smaller sample or by adding a known amount of the standard alkali. The addition was made at least 1 hour after the estimation began and the amount added was not sufficient to render the solution more alkaline than pH 7, or to cause alteration of any reducing groups present.

If x was the sample weight in grams, and y the difference in titer between experiment and blank, expressed in milliliters of normal alkali, then the moles of carboxyl per gram sample was $6y/5000x$.

Silver o-Nitrophenolate Method *(11, 16b)*.

Ten grams of o-nitrophenol was warmed with 500 ml. of water to 70°C.; 15 grams of silver oxide was added with stirring and after 2 hours the orange liquid was filtered from the excess silver oxide. On cooling, the filtrate deposited orange colored prisms which were recovered, dried, and stored in a brown

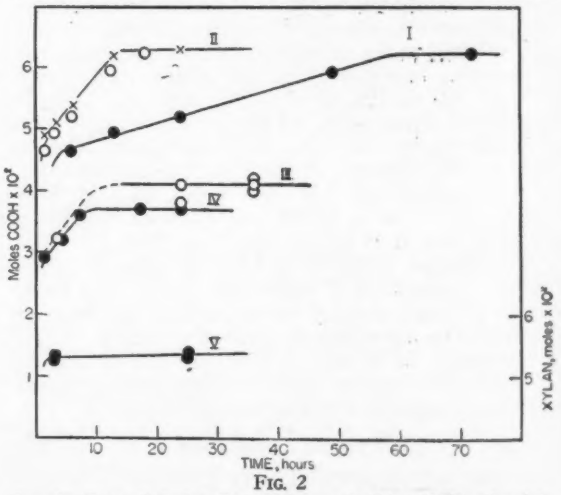


Fig. 2

Reaction Rates of Carboxylic Acid Groups in Silver O-Nitrophenolate and Calcium Acetate Methods, Each Point Representing an Independent Estimation. Ordinates, Moles COOH per Base Mole Cellulose. Plot I, CrO_3-Oxycellulose, CR-G and Silver O-Nitrophenolate. Plot II, Open Circles, same as Plot I but with Time Scale Reduced in Ratio 4:1; Crosses, Same Oxycellulose, CR-G, and Calcium Acetate on Original Time Scale. Plots III and IV, CrO_3-Oxycelluloses by Calcium Acetate Method; Open Circles, CR-8; Filled Circles, CR-6. Plot V, with Right Hand Ordinates, Xylan X-8 and Calcium Acetate.

bottle. The orange filtrate was warmed with 2 to 3 gram of silver oxide and, after filtration, was diluted to 1.5 liters and stored in a brown bottle. Further supplies of silver o-nitrophenolate solution, pH about 7.3, were made as needed by dissolving about 1 gram of the solid in a liter of warm water. Titration of a 25 ml. aliquot by Volhard's method *(14, 18)* with 0.04 *N* ammonium thiocyanate, in the presence of 5 ml. of 6 *N* nitrous-free nitric acid *(5)* and 1 ml. of saturated ferric ammonium sulphate as an internal indicator, showed that the silver o-nitrophenolate solution was 0.00495 *N*. The titer remained unchanged for at least 6 weeks when the solution was properly preserved. An alternative method of preparation is given by Elizer *(5)*.

Oxycellulose or other samples of about 0.5 gram were weighed and immersed in 100 ml. of the silver o-nitrophenolate solution. The mixture was kept at 20°C. in the dark, usually for about 72 hours. Aliquots, 25 ml., were then titrated with the ammonium thiocyanate solution. If x was the sample weight in grams, and y the decrease in milliliters of *N* thiocyanate between the experiment and the blank, the moles of carboxyl per gram sample was $4y/1000x$. The end-point in the titrations was very sharp.

Xylamine Methylhydroxylamine Hydrochloride Method.

The estimation of carbonyl groups by the hydroxylamine hydrochloride method C was fully described in an earlier article *(6)*. The methylhydroxylamine salt was employed in essentially the same way.

In a typical estimation, 7.0 gram of pure methylhydroxylamine hydrochloride, purchased from the Eastman Kodak Company, was dissolved in 455 ml. of water and 91 ml. of 0.49 *N* NaOH to give a solution of pH 4.6, measured on a Beckmann pH meter. The solution was used on the day it was prepared. Aliquots, 60 ml. or 0.009 mole, of this solution were allowed to react at 20°C. with weighed samples of oxycellulose (about 2 gram) or of reducing sugars (about 0.2 gram or 0.0014 to 0.0006 mole). Blanks were run and were stable throughout the reaction time (usually about 24 hours). At the end of the designated period, the oxycellulose was removed through a dry filter. Aliquots, 50 ml., of such filtrates, or similar aliquots of the solutions containing sugar, were then titrated to pH 3.0 with 0.1 *N* HCl and with the aid of the pH meter. Blanks were titrated first in order to note the final volume of the system. The other titrations were then interrupted at pH 4 or 3.5 and their volumes were adjusted with distilled water to that of the blank before the titration to pH 3.0 was completed. This procedure minimized any inaccuracy caused by different degrees of dilution in the estimation and the blank. Figure 1, plots II and III, reproduces the final portions of typical electrometric titrations of the hydroxylamine and methylhydroxylamine solutions. Duplicate titrations usually agreed to 0.05 ml.

When x was the sample weight in grams, and y the difference in titer between experiment and blank in milliliters of *N* acid, the carbonyl content in moles per gram was $6y/5000x$. If the estimation was carried out on the neutral calcium salt recovered from the calcium acetate estimation, the result represented the carbonyl content only. Estimations of acidic samples gave the molar amount of carbonyl plus carboxyl groups, as already explained for the hydroxylamine hydrochloride method *(6)*.

In all estimations, results expressed as moles per gram were converted to moles per mole sample by multiplying by the factor 162 for oxycellulose and 132 for oxyxylan. These figures are the base molar weights of cellulose and xylan respectively, but the small, unknown changes in weight caused by the oxidations were neglected.

Results and Discussion

Comparison of Silver o-Nitrophenolate and Calcium Acetate Methods.

Most of the early difficulty experienced in correlating these methods originated in the fact that the carboxylic groups in oxycelluloses are strongly acidic, being comparable in strength to glyceric or gluconic acids *(16a)*. Unless the process of removing the cations (de-ashing) they so readily acquire from salt solutions, or ordinary tap water, was very thoroughly performed by repeated extraction with dilute acid or otherwise, some of the carboxyl groups were present as salts and the two methods of estimation gave low and discordant results. Figure 2, plot I, shows that a thoroughly de-ashed chromium trioxide oxycellulose rapidly removed silver from the o-nitrophenolate solution during the first few hours but that an abrupt decrease in rate postponed the completion of the reaction until at least 70 hours had elapsed. The value of 0.061 moles of carboxyl reached after that time confirmed that found by the calcium acetate method on the same oxycellulose (0.0623 moles, plot II; crosses). In a second comparison, kindly carried out by Mr. G. H. Segall on a similar oxycellulose, values of 0.0385, 0.0388; 0.0391, and 0.0395 moles carboxyl, obtained after 24 and 48 hours respectively, confirmed the horizontal nature given the latter part of plot II for calcium acetate. The corresponding figures for the silver o-nitrophenolate method were in agreement at 0.0405, 0.0408 moles after 72 hours, but diverged to 0.0451, 0.0449 moles after 144 hours. Since the silver reagent was rapidly reduced by some hypochlorite oxycelluloses (see below), the divergent results obtained after 144 hours were attributed to a minute but progressive reduction of the same sort, caused by carbonyl groups in the chromium trioxide oxycellulose used. Plot I therefore slopes slightly upward after 72 hours. When the time scale for the o-nitrophenolate method (plot I) was diminished in the ratio of 4:1, the rate plot coincided up to 72 hours with that of the calcium acetate method within the limits of experimental error (plot II; circles). This observation strongly suggested that a portion of the acidic groups in the oxycellulose was not immediately accessible to either reagent, but became accessible as a result of diffusion. Interesting articles by Sollner detail this theoretical concept with particular reference to acid-base exchange phenomena during diffusion through oxidized collodion membranes *(13)*. With this assumption, it was easy to understand why the time for complete reaction in the calcium acetate method varied from one oxycellulose to another with variation in the amount of the accessible fraction. This time was about 13 hours for the first oxycellulose (crosses on plot II), not more than 10 hours for another chromium trioxide oxycellulose (plot IV) and not more than 3 hours for xylan (plot V), whose gelatinous nature in aqueous suspension probably made diffusion effects of minor importance. It appeared prudent from the results to increase the time for the calcium acetate reaction from the earlier value of 3 hours *(6, 16a, 20)*

to 24 hours *(16a)* and that of the o-nitrophenolate reaction from 24 hours *(16b)* to 72 hours. These precautions were observed in subsequent work.

Although the silver o-nitrophenolate estimation took longer, the sharpness of the end-point in the final titration made it more accurate than the calcium acetate method for minute amounts of carboxyl groups. The unoxidized but swollen cellulose, for example, had 0.0008 moles of carboxyl by the former method and 0.0022 moles by the latter. The difference of 0.0014 moles per glucose residue would be accounted for by an error of 0.4 ml. of 0.01 *N* NaOH in the electrometric titration of the heavily buffered calcium acetate solution. On the other hand, some hypochlorite oxycelluloses reduced the silver reagent and the fibers became blackened with colloidal silver, thereby spuriously increasing the measured carboxyl content. One hypochlorite oxycellulose, found to have 0.0120 and 0.0121 moles carboxyl by the calcium acetate method, had an apparent content of 0.035 moles owing to the reduction of the silver o-nitrophenolate reagent. Although such reduction was inconsequential with chromium trioxide oxycelluloses, and was not observed for hypochlorite products reoxidized with chlorous acid, the use of the method with any reducing oxycellulose was discontinued.

Comparison of Hydroxylamine and Methylhydroxylamine Methods.

The upper portion of Table I shows that the condensation of the carbonyl groups of glucose with excess methylhydroxylamine for 5.7 to 22 hours did not exceed 85 to 89% when the final pH in the titration was 2.6. Adjustment of the final pH to 3.0, however, raised the recovery of glucose to 93 to 102% provided the time of condensation was 16 to 24 hours. Increase of the sample weight from 114 to 406 mg. was of little moment, as a comparison of the seventh and eighth entries in the table makes clear. Since the use of a reaction time of 24 hours and a final pH of 3.0 would give recoveries of 92 to 97% for all the other sugars listed in the lower part of Table I, the same conditions were adopted as standard for the estimation of the reducing groups in oxycelluloses. The average recovery for sugars was 95%, or almost as high as that of 98% previously found for the hydroxylamine method *(6)*. No systematic attempt was made to follow rates of condensation with methylhydroxylamine for the various sugars or to classify these rates as "fast" or "slow", as was done for the hydroxylamine estimation in the earlier work.

TABLE I.—DETERMINATION OF THE CARBONYL CONTENT OF SUGARS WITH METHYLHYDROXYLAMINE REAGENT[a]

Sugar	Milligrams of Sugar Taken	Time, hours	Millimoles of Carbonyl Taken	Millimoles of Carbonyl Found	Per Cent Carbonyl Found
Solutions titrated to pH 2.6					
Glucose	111	1.3	0.602	0.282	47
Glucose	93.6	5.7	0.520	0.451	87
Glucose	111	19	0.602	0.536	89
Glucose	93.6	22	0.520	0.432	85
Solutions titrated to pH 3.0					
Glucose	141	6	0.783	0.713	91
Glucose	115	6	0.639	0.652	102
Glucose	114	16.5	0.633	0.605	96
Glucose	406	18	2.26	2.10	93
Glucose	115	24	0.639	0.652	102
Mannose	106	3.5	0.589	0.569	97
Galactose	119	1.7	0.661	0.608	92
Galactose	217	6	1.21	1.12	93
Fructose	108	4.5	0.600	0.556	93
Xylose	191	6.5	1.27	1.21	95
Arabinose	189	18	1.26	1.22	97
Lactose	463	18	1.35	1.28	95
Cellobiose	338	7	0.988	0.921	93

[a] Sample dissolved in 50 ml. of a solution made up from 8.0 gram methylhydroxylamine hydrochloride, 410 ml. of water and 0.49 *N* caustic soda to pH 4.6. Blank was changed from initial pH to final pH of 3.0 by addition of about 45 ml. of 0.11 *N* HCl.

TABLE II.—STABILITY OF METHYLHYDROXYLAMINE AND HYDROXYLAMINE REAGENTS AT 20° C.

Methylhydroxylamine		Hydroxylamine	
Hours	0.11 *N* HCl,[a] ml.	Hours	0.11 *N* HCl,[b] ml.
0	18.4	0	23.0
23	18.9	24.5	21.7
47	19.0	45.5	20.8
68	18.8	74	19.6
145	18.8	97	19.2

[a] Required to change the pH of a 50 ml. aliquot from the initial value of 4.1 to 2.6. Reagent contained 4.0 gram of methylhydroxylamine hydrochloride in 260 ml. of 0.038 *N* NaOH.
[b] Required to change the pH of a 50 ml. aliquot from the initial value of 5.3 to 3.5. Reagent contained 6 grams of hydroxylamine hydrochloride in 260 ml. of 0.048 *N* NaOH.

Table II contrasts the stability of the methylhydroxylamine reagent with the instability of the hydroxylamine system under the conditions used in the estimations. The titer of the former varied between 18.4 and 19.0 ml. of acid during 145 hours, but that of the latter decreased steadily from 23.0 to 19.2 ml. of acid in 97 hours. Although this decrease in the blank did not seriously interfere with the estimation of carbonyl groups in reducing sugars for periods of up to 24 hours, the instability of the hydroxylamine reagent resulted in serious uncertainties when its reaction with oxycelluloses was prolonged much beyond 3 hours. The greater reliability of the methylhydroxylamine reagent in this case is obvious from Fig. 3, where plots I and II record separate estimations made with the two reagents on the same acidic oxycellulose during 24 hours. After 1.5 to 3 hours, however, the values for carbonyl plus carboxyl recorded by the hydroxylamine reagent exceeded those reached by the more slowly reacting methylhydroxylamine after 12 hours by 5%. The difference diminished to within the experimental error when carbonyl groups only were estimated on calcium salts of the oxycellulose (plots III and V), or when the carboxylic acid content was low, as in experiments with an acidic hypochlorite oxycellulose (plot IV). Since it was doubtful whether the formation of methylhydroxylammonium salts was quantitative at the final pH of 3.0 used in the estimation, the somewhat higher results given by the hydroxylamine method (final pH 3.2, for acidic oxycelluloses were preferred.

Plot II of Fig. 3 shows that an initial rapid condensation of methylhydroxylamine with the oxycellulose, complete within 4 hours, is succeeded by a slower reaction. The initial condensation was not exclusively methylammonium salt formation with carboxyl groups because it was still evident when the neutral calcium salt was used and no such groups were present (plot III). Neither could it be attributed exclusively to aldehyde as opposed to ketone groups because an initial fast condensation is evident in plot V, which records experiments made with the calcium salt of an oxycellulose presumably freed of aldehyde groups by oxidation with chlorous acid. The previous suggestion (6) that in oxycelluloses aldehyde might condense more rapidly than ketone groups with hydroxylamine therefore receives no support, and it now seems probable that the initial fast reaction concerned the accessible carbonyl and carboxyl groups. Less accessible groups would be expected to respond more slowly to the hydroxylamine and methylhydroxylamine, as well as to the calcium acetate and silver o-nitrophenolate (Fig. 2) estimations. The general trend of the results was to uphold the validity of the 1.5 hour hydroxylamine estimation, particularly for oxycelluloses with acidic as well as carbonyl groups. Methylhydroxyl-

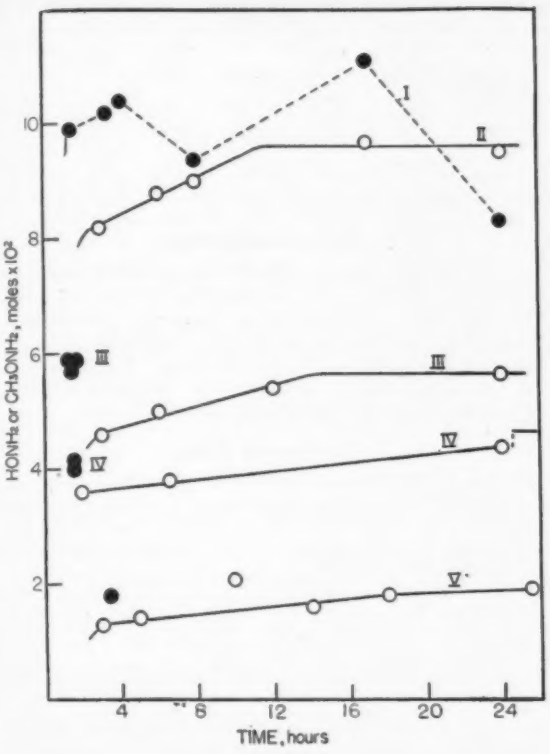


FIG. 3

Rates of Condensation of Methylhydroxylamine, Open Circles, and of Hydroxylamine, Filled Circles, with Carbonyl Groups in Oxycelluloses, Each Point Representing an Independent Estimation. Ordinates, Moles per Base Mole Cellulose. Plot I, Combination of Hydroxylamine with the COOH plus CO groups in the Acidic, CrO_3-Oxycellulose CR-7. Plot II, Same as Plot I but with Methylhydroxylamine. Plot III, Methylhydroxylamine and Neutral Calcium Salt of CR-7, with Triplicate Points for Hydroxylamine. Plot IV, Methylhydroxylamine and HClO-Acidic Oxycellulose, CO-9; Values after 30 and 48 Hours were 4.6×10^{-3} and 4.7×10^{-3} Moles, Respectively; Duplicate Points for Hydroxylamine. Plot V, Methylhydroxylamine and Calcium Salt of CR-7, Formed after Reoxidation of Latter with Chlorous Acid.

amine was obviously the superior reagent for prolonged rate studies of the condensation.

Oxidations with Chromium Trioxide.

Dry, highly swollen linters were oxidized with chromium trioxide in acetic acid-acetic anhydride to the extent noted in the first three lines of Table III, column 1. As indicated by the practically quantitative yield, column 2, this extent was insufficient to cause much loss of oxidant in water-soluble degradation products. The calcium acetate estimations of carboxyl content (column 3) were in all cases the mean of closely concordant duplicate or triplicate estimations, run for 18 to 24 hours. In calculating the corresponding amount of oxidant recovered as carboxyl (column 5), it was assumed that two atoms of oxygen were required *(6)*. The carbonyl values quoted in column 4 were obtained on the calcium salts by the 1.5 hour hydroxylamine or the 24 hour methylhydroxylamine methods. Both methods frequently were checked against each other, always with results concordant to 3%, on the same oxycellulose. Oxidant recovered as carbonyl (column 6) was calculated on the basis that one atom of oxygen produced one carbonyl. In calculating the recoveries (columns 5, 6 and 7), no allowance was made for the 0.0022 moles of carboxyl and the negligible amount of carbonyl *(6)* found in the original, swollen cellulose. It will be noted from column 7 that 86 to 90% of the oxidant reappeared in the oxycellulose. This result is considered to be satisfactory, since titration errors in the carboxyl and carbonyl estimations were each of the order of ± 3%. Moreover, no account was taken of the ash content, 0.2 to 0.3%, mainly Cr_2O_3, of small errors in the moisture determinations, or of the slight increase in the base molecular weight of the oxycellulose, or of any slight loss of oxidant in degradation products.

The re-oxidation of oxycellulose CR-7 with excess chlorous acid proceeded smoothly in duplicate experiments to give white, friable, fibrous powders with concordant analyses. A mean carboxyl content of 0.074 moles in the product was 0.029 moles higher than that of the CR-7 (0.045 moles) and therefore 0.029 moles, or 51%, of the carbonyl groups in the latter (0.057 moles) were probably aldehyde. On the other hand, the chlorous acid failed to oxidize 0.018 moles, or 32%, of the carbonyls and this fraction was presumably ketone. Since the sum of the carbonyl and carboxyl in CR-7 was (0.045 + 0.057) or 0.102 moles, and of this only (0.074 + 0.018) or 0.092 moles were recovered after the re-oxidation, the difference of 0.010 moles was lost as water-soluble materials. This inference was supported by the slightly low yield, 97 or 98%, of the re-oxidized product. When account is taken of this loss, 0.029 to 0.039 moles of the carbonyl in CR-7 was probably aldehyde, and 0.018 to 0.028 moles was probably ketone.

As already explained, xylan differs from cellulose in having no primary alcohol groups and consequently any carbonyl content of an undegraded oxyxylan would be exclusively ketonic. The oxyxylan XR-10

TABLE III.—OXIDATIONS OF SWOLLEN CELLULOSE AND XYLAN AT 20° C.

Sample	Atoms O Consumed [a] (1)	Yield, % (2)	Carboxyl Moles [a] (3)	Carbonyl Moles [a] (4)	Oxidant Recovered as Carboxyl, % (5)	Oxidant Recovered as Carbonyl, % (6)	Total Recovery of Oxidant, % (7)
Chromium trioxide oxidations							
Oxycelluloses							
CR-9	0.150	103	0.038	0.052	51	35	86
CR-8	0.150	100.5	0.041	0.053	55	35	90
CR-7	0.164	102	0.045	0.057	55	35	90
CR-7 after $HClO_2$	....	{97	0.073	0.018			
		{98	0.075	0.018			
Oxyxylan							
XR-10	0.194	91.3	0.093	0.032			
Original xylan	....	...	0.053	0.000			
Corrected	0.194	91.3	0.040	0.032	37 [b]	15 [b]	52 [b]
XR-10 after $HClO_2$	....	88 [c]	0.086	0.001			
Hypochlorite oxidations (see Table IV)							
Oxycelluloses							
CO-10	0.100	99.6	0.016	0.023	32	23	55
CO-9	0.131	97.3	0.011	0.037	17	28	45
CO-8	0.135	98.3	0.014	0.019	20	15	35
Oxyxylan							
XO-5-2	0.23	83.2	0.072	0.020			
Original xylan	....	...	0.049	0.015			
Corrected	....	...	0.023	0.005	17 [b]	2 [b]	19 [b]

[a] Per glucose or xylose unit. [b] Corrected for loss in yield. [c] Based on XR-10 as 100%.

(Table III), produced under exactly the same conditions as the oxycellulose CR-7, was accordingly studied. After making corrections for the carboxylic acid content of the original xylan and for the low yield (91.3%), only 52% of the oxidant was recovered in the oxyxylan; the remaining 48% having apparently been consumed in an intense oxidation of 8 or 9% of the xylan to a colloidal or soluble condition. Although the carboxyl content of 0.040 moles introduced was unexpectedly high, the carbonyl value of 0.032 moles was close to the maximum already inferred for ketone groups in CR-7 (0.028 moles). An attempt to prove that the carbonyl groups in the oxyxylan were all of a ketonic nature was made by the chlorous acid method. The re-oxidation, however, removed practically all of the carbonyl and a few of the carboxyl-containing units as water-soluble substances which amounted to 12% of the oxyxylan used. This circumstance rendered the analytical results quoted in the table of little significance for the object in view.

Since this aqueous oxidizing solution further swelled the dry, already swollen linters and gelatinized the xylan, it was assumed that the fraction of the carbohydrates immediately accessible to the reagent would not be less than the 20% found for cellulose and chromium trioxide in acetic acid-acetic anhydride. In order to avoid the production of degraded, secondary oxidation products, the oxidations of cellulose with sodium hypochlorite were terminated when much less than 0.2 atoms of oxygen per glucose unit had been utilized. Table IV summarizes the conditions employed in three such oxidations, two of which, CO-9 and CO-8, were duplicated as closely as possible with xylan, XO-5 and XO-5-2, respectively. It was unfortunate that these oxidations required 96 to 240 hours, because in this long period the initial products might have undergone change, even although the pH range of 3.4 to 6.0 was chosen in the hope of avoiding this difficulty. Although the oxidation level of these hypochlorites was less than that of the chromium trioxide products (Table III, column 1), the former possessed a much greater tendency to disperse colloidally in water, were very much more friable and were more difficult to handle quantitatively. Since the calcium salts had similar properties and their preparation involved an additional step, carbonyl plus carboxyl (hydroxylamine) and carboxyl (calcium acetate) estimations were made on the acidic products and the carbonyl contents were obtained by difference. Attempts at re-oxidation with chlorous acid were unsatisfactory owing to poor yields.

Column 7 of Table III shows that the recovery of oxidant in the oxycelluloses was only 35 to 55% and that the yields (column 2) were distinctly less than theory. The remainder of the oxidant had presumably expended itself on the small portion of the cellulose that was degraded to the water-soluble state. A similar conclusion applied with even greater force to the hypochlorite oxyxylans, with one of which the recovery of oxidant was only 19% and the yield recovery only 83%. When similarly oxidized with chromium trioxide or hypochlorite, xylan consumed more atoms of oxygen than cellulose, mole for mole, but the number recovered in the insoluble product as carboxyl plus carbonyl (columns 3 and 4) was less. In each case the deficiency originated in the comparative lack of carbonyl groups in the oxyxylans and, presumably, in the ease with which xylan units containing such groups were rendered water-soluble.

TABLE IV.—CONDITIONS FOR HYPOCHLORITE OXIDATIONS AT 20° C.

Sample	Moles HClO [a]	Liquor Ratio	Hours	Initial pH	Final pH	Moles HClO Used [a]
Oxycelluloses						
CO-10	0.25	100:1	120	6.0	5.5	0.100
CO-9	0.34	75:1	96	5.25	5.05	0.131
CO-8	0.28	58:1	240	3.4	3.3	0.135
Oxyxylans						
XO-5	0.28	75:1	96	5.25	4.95	0.175
XO-5-2	0.23	58:1	240	3.4	...	0.227

[a] Per glucose or xylose unit.

Acknowledgement

The authors wish to thank the following organizations for the financial assistance which made it possible for them to complete the research: The Fundamental Research Committee of the Technical Association of the Pulp and Paper Industry, E. I. du Pont de Nemours and Company, the Hercules Powder Company, and the Mathieson Alkali Works.

Literature Cited

1. Anderson, E., Hechtman, J., and Seeley, M., *J. Biol. Chem.* 126: 175 (1938).
2. Association of Official Agricultural Chemists, *Official and Tentative Methods of Analysis*, 5th ed., Collegiate Press, Menasha, Wis., 1940, p. 361.
3. Bywater, R. A. S., Haworth, W. N., Hirst, E. L., and Peat, S., *J. Chem. Soc.*, 1983 (1937).
4. Davidson, G. F., *J. Textile Inst.*, 29: T 195 (1938).
5. Elizer, L. H., *Ind. Eng. Chem., Anal. Ed.*, 14: 635 (1942).
6. Gladding, E. K., and Purves, C. B., *Paper Trade J.* 116, No. 14: 26 (April 8, 1943); *Tech. Assoc. Papers* 26: 119 (1943).
7. Jeanes, A., and Isbell, H. S., *J. Research Nat. Bur. Standards* 26: 205 (1941).
8. Martin, A. R., Smith, L., Whistler, R. L., and Harris, M., *J. Research Nat. Bur. Standards*, 27: 449 (1941). *Am. Dyestuff Reptr.*, 30: 628 (1941).
9. Meyer, K. H., *Trans. Faraday Soc.*, 33: 1073 (1937).
10. Angell, S., Norris, F. W., and Resch, C. E., *Biochem. J.*, 30: 2146 (1936).
11. Ott, E., *Cellulose and Cellulose Derivatives*, Interscience Publishers, New York, N. Y., pp. 127-129.
12. Rutherford, H. A., Minor, F. W., Martin, A. R., and Harris, M., *J. Research Nat. Bur. Standards*, 29: 131 (1942); *Am. Dyestuff Reptr.* 31: 399 (1942).
13. Sollner, K., *J. Phys. Chem.*, 49: 47, 171, 265 (1945).
14. Scott, W. W., *Standard Methods of Chemical Analysis*, 5th ed., Vol. 1, Van Nostrand, New York, 1939, p. 824.
15. Sookne, A. M., Fugitt, C. H., and Steinhardt, J., *J. Research Nat. Bur. Standards*, 25: 61 (1940).
16. Sookne, A. M., and Harris, M., *J. Research Nat. Bur. Standards*, (a) 25: 47 (1940); (b) 26: 205 (1941).
17. Treadwell, F. P., and Hall, S. B., *Analytical Chemistry*, Vol. II, 3rd ed., J. Wiley and Sons, New York, 1913, p. 701.
18. Volhard, J., *J. prakt. Chem.*, 9: 217 (1874).
19. Whistler, R. L., Martin, A. R., and Harris, M., *J. Research Nat. Bur. Standards*, 24: 13 (1940).
20. Yackel, E. C., and Kenyon, W. O., *J. Am. Chem. Soc.*, 64: 121 (1942).

New TAPPI Members

Kuang-Chun Ying, Chemical Engineer, Nekoosa-Edwards Paper Co., Port Edwards, Wisconsin, a 1933 graduate of Soochow University. Mr. Ying is in this country for the Chinese Government for the purpose of studying pulp and paper manufacturing here.

Ward Pigman, Research Associate, Institute of Paper Chemistry, Appleton, Wisconsin, a 1936 graduate of the University of Maryland. He was formerly employed by the National Bureau of Standards, Washington, D. C.; University of Leipzig, Germany; Corn Products Refining Co., Argo, Illinois.

Warren R. Price, Consulting Chemical Engineer and owner of Applied Research Service, Chicago, Illinois, a 1926 graduate of Luther College and a 1933 graduate of Iowa State College. Formerly employed by Bristol Company, Decorah, Iowa. He is a licensed professional engineer in the State of Illinois.

Sven Quist, Project Engineer, Powell River Co. Ltd., Vancouver, B. C., Canada, a 1928 graduate of Copenhagen College. Formerly employed by Canadian General Electric Co. Ltd., Peterborough, Ont.; Imperial Oil Ltd., Sarnia, Ont.; Manager, Pulp and Paper Division, Mason Regulator Co., Canada Ltd., Montreal, P. Q.

Flax Straw Procurement*

By L. F. Dixon[1]

Abstract

The procurement of agricultural wastes such as cereal and flax straws for paper manufacture has been severely impeded in the last two years by labor shortage, machinery shortage and inefficiency, high cost of baling and hauling, lack of producer interest in returns from these wastes, and expanding use of combines.

The requisite stocks of these materials were not obtained from the 1944 crop, and it becomes more and more apparent that improvements in methods and machinery must be developed to enable greater quantities to be collected in a more efficient and economical manner.

The purchase of flax straw for the fine paper trade has expanded greatly in the last eight years. Purchases have increased from 5,200 tons in 1937 to an estimated 360,000 tons in 1945. At the present time approximately 25% as much flax straw is being purchased as all other cereal straws combined. This report covers certain improvements which have been effected in collecting and handling flax straw for what value they may prove to be in helping solve cereal straw problems.

At the present time the price of flax straw delivered to the fiber mill is divided about as follows: 17% net to the grower, 63% to balers and truckers, and 20% freight. There is no doubt that too much of the flax straw dollar is consumed in baling, trucking, and freight, and too little is going to the grower of the straw. It is equally obvious that if the farmer would do his own baling and hauling he would obtain 80% of the delivered price rather than the present 17% where he does nothing to preserve or put his straw in marketable condition. The great problem of the flax straw industry is to devise machinery and handling methods which will collect the crop more rapidly, more cheaply, and in better condition, and thus provide more return to the grower of the straw.

The problems are not yet solved in the case of flax straw, but steps taken in this direction will be enumerated.

Portable Cleaners

At the present time perhaps twelve portable straw cleaners are in operation. These machines are pulled from farm stack to farm stack as long as weather permits (usually until November in the Midwest). This reduces the weight considerably, produces well cleaned straw in compact bales, and, given good weather, is an economical operation. Loss of machine time in bad weather and when handling wet straw often results in an expensive product. At times it is more economical to haul the straw to the machine rather than experience excessive inoperative time in making successive setups of the cleaner over long distances. It is also necessary to accumulate stack yards of loose straw to enable continued operation when weather prevents machine operations on the farm. Acute judgment must be exercised to make portable cleaner operations economical.

Baling

Straw baling is accomplished by many methods.

1. Contract stationary baling from stationary thresher stacks. Efforts are made to procure thorough shaking prior to balirg.

2. Company operated stationary baling from stationary thresher stacks. Straw is shaken in this case.

3. Contract pick-up baling (large 5-man baler). This combine straw is free of chaff, but extra raking required makes baling costs considerably higher.

4. Company owned pick-up balers. Recently these operations have been with the automatic twine and wire machines. Actual baling is much cheaper but the bales are so poor that stacking is impossible and the great number of broken bales involved brings the total handling cost up to that of the standard pick-up baler. It is necessary to send such bales directly to the mill and process them directly from the cars to avoid heavy loss in broken bale handling.

5. Pick-up baling in which a side delivery rake is attached to the towing tractor and raking and baling done in one operation. This shows promise of economy, but there yet remain many kinks to be ironed out before it can be considered successful.

6. Baling loose straw with stationary balers from loose straw stack yards. This is done at times, but it is very expensive because of the high cost of collecting and handling loose straw. This procedure is used only in an emergency and is not recommended.

The threshing and baling equipment and methods are not satisfactory largely because costs are high when a satisfactory product is turned out. For instance, chaff is an abomination and should be eliminated from straw both because of the greatly reduced yields produced and because a bale of high chaff content will deteriorate quickly and badly. Despite this fact, present stationary threshers combine chaff and straw and throw it out on the same pile. It is thought that there are distinct possibilities of stationary threshers employing chaffers and baling good straw simultaneously with threshing, and thus eliminating straw handling and markedly reducing baling costs. It appears senseless to separate chaff from straw in the thresher, then combine it, only to create the necessity and expense of again separating it. It is planned to investigate the above next season.

The automatic balers as now manufactured are not the answer to the large commercial buyers' baling problem. The bales are not sufficiently good to stand stacking and hauling, and truckers as a rule refuse to handle the light, fragile bales. There is a distinct place for an automatic baler which will produce a good bale of good weight, but, up to the present, such equipment is not available. The farm equipment manufacturers have not yet solved this problem, in the author's estimation. The wider use of agricultural wastes will hinge largely on improvements to existing gathering equipment or the development of new types.

Combines are growing in popularity, and each new combine adds to straw procurement difficulties. First, raking is involved in recovering combine straw, and because of the comparatively large area required to be covered by the pick-up baler, resultant costs are high. Raking and baling in one operation reduces this cost but it remains high. Furthermore, it is necessary to

* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 25-28, 1946.

[1] Vice President Central Fibre Corp. and California Central Fibre Corp., Pisgah Forest, N. C.

collect combined straw very rapidly to prevent deterioration. The amount of equipment and labor required to handle a large tonnage of combine straw in this short time is enormous as compared to handling stacked straw throughout the year. In addition, the variable weathering experienced makes for more irregularity of quality than is the case with stacked straw. Some progress has been made in handling combine straw. It is estimated that three times as much combine flax straw was purchased in 1945 as in any previous year, despite the added trouble and expense.

In the last few years it has been necessary to handle large tonnages of loose flax straw because baling could not be accomplished. By utilizing booster buck rakes in loading trucks and making stacks, the cost has been reduced and greater and greater tonnages handled. These loose stacks are handled through portable cleaners and balers during the winter season, and the method has proven itself in reducing straw shrinkage and giving a reasonable cost. This procedure has enabled the procurement of many thousands of tons which could not have been baled with the labor, equipment, and time available.

These loose stacks are covered with sisal kraft paper held in place by weighted strips of hog wire. It is necessary to inspect this covering regularly and keep it in good repair. There is also quite an art in its proper application. The same expertness of technique is required in building the loose straw stack to prevent distortion and sagging during settlement.

Baled Straw Stacking

There is no doubt that the proper way to have good straw is to bale it dry and store it in warehouses or covered sheds. However, the tonnages have become so great that investment in sufficient sheds or storages is not practical. Furthermore, from a fire hazard viewpoint it is desirable to scatter the stock.

Because of these factors the bulk of flax straw is stored in outside stacks. Selection of well-drained sites combined with good stacking and good covering with sisal kraft paper has worked out well. The covering of stacks with a layer of flax shives has given varying results and is not in general practice.

As a rule stacks are spaced 75 to 100 feet apart as a safety factor in case of fire. Tonnages are held down to 350 to 450 tons per stack for the same reason.

Method of Purchasing

Flax straw is purchased direct from the farmer in the stack as is. Payment is made, on the scale weight of the material, direct to the grower. Dockage is generally taken on exceptionally wet material or material carrying a very high weed content. In mailing out straw checks to the farmer, pamphlets are enclosed giving suggestions as to the best agronomic practices in growing flax or controlling weeds.

It is most important to have an excellent field organization, as it is imperative that purchases be made and field operations so scheduled as to avoid excess or duplicate hauling and that a minimum of operational time be lost. Economical field costs depend largely on the ability, energy, and good planning of the field organization. As a rule the organization handling the largest tonnage experiences the lowest operating cost per ton. It is entirely possible that an efficient central buying agency for handling the total cereal straw requirements would provide better in quantity, quality, and price than is now achieved by independent buying by the individual mills.

TAPPI Notes

Charles Stevens, formerly chief engineer, Glass Fibers Inc., Toledo, Ohio, is now assistant general manager in charge of engineering research and development of their plant at Waterville, Ohio.

Einar Walloe, formerly general pulp mill superintendent of Bloedel, Stewart & Welch, Vancouver, B. C., is now general superintendent of their new kraft mill at Port Alberni, B. C., Canada.

Jack E. Weaver, formerly with the U. S. Army, is now technical director, Mohawk Paper Mills, Inc., Cohoes, N. Y.

Benjamin D. Levine, formerly with the U. S. Navy, is now chemist in charge of development and control, Minerva Wax Paper Co., Minerva, Ohio.

Photomicography

John Wiley & Sons, Inc., has reprinted "Photomicography in Theory and Practice, by Charles P. Shillaber (773 pp. 5½x8½). It was orginally printed in 1944 and quickly went out of print. It is largely a book of reference in which the author has drawn freely from a wide range of information sources. It deals with the four outstanding laboratory optical instruments, the camera, the telescope, the spectrascope and the microscope. The microscope with its accessories is by far the least understood, the most inefficiently operated, and the most abused. There are many microscopes in use, but there are few competent microscopists to use them.

Among the subjects covered are: Methods of lighting and photometric units; Light, lenses, images, and objectives; Illuminating apparatus, slides cover glasses; Light filters and control of glare; Cameras and photographic technique, Mounting media, stains, reagents and solvents; and Analysis of practical photomicrographic problems.

Copies may be obtained from the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd Street, New York 17, N. Y. at $10.50 per copy.

Economics in One Lesson

Harper & Brothers have recently published "Economics in One Lesson" by Henry Hazlett of the New York Times. This book has received considerable newspaper publicity and has been widely recommended to those who would be interested in reading about economics when presented by an author who is himself a competent economist and at the same time can present his subject in a clear, simple, and interesting manner—a rare combination in this field. The book is written for the individual who has no previous experience with economics.

The book's main thesis is that sound economic thinking takes account of the long run no less than the short run, the overall public interest as against special interests, and the secondary consequences as well as primary consequences. The book is prepared as an analysis of economic fallacies. This appears to be the simplest and most interesting way to illustrate the fundamentals of economics.

Copies may be obtained from the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd Street, New York 17, N. Y., at $2.00 per copy.

Paper and Paper Stock Imports At New York and Other Ports

NEW YORK IMPORTS

WEEK ENDING OCTOBER 26, 1946

SUMMARY

Newsprint	1,438 rolls
Wallpaper	1 cs.
Photo Paper	10 cs.
Parchment Paper	10 cs.
Decalcomania Paper	53 cs., 15 drums
Surface Coated Paper	6 cs.
Tracing Cloth	54 cs.
Writing Paper	2 cs.
Tissue Paper	3 cs.
Wafer Paper	27 cs.
Miscellaneous Paper	7 cs.

NEWSPRINT

H. G. Craig Co., G.T.D., Donnacona, 363 rolls.
International Paper Co., International No. 1, Gatineau, 310 rolls.
H. G. Craig Co., Donpaco, Donnacona, 377 rolls.
H. G. Craig Co., G.D.D., Donnacona, 378 rolls.

WALLPAPER

(———), James M. Wayne, Liverpool, 1 cs.

PHOTO PAPER

Phoenix Shipping Co., Midland Victory, Antwerp, 10 cs. (raw base).

PARCHMENT PAPER

Dingelstedt & Co., Midland Victory, Antwerp, 10 cs.

DECALCOMANIA PAPER

B. F. Drakenfield & Co., James M. Wayne, Liverpool, 53 cs., 15 drums (duplex).

SURFACE COATED PAPER

Gevaert Co. of America, Westerdam, Antwerp, 6 cs.

TRACING CLOTH

(———), James M. Wayne, Liverpool, 9 cs. (bleached cotton).
E. Dietzgen & Co., Vasconia, Liverpool, 7 cs. (cotton); 20 cs. (bleached cotton).
Keuffel & Esser Co., Vasconia, Liverpool, 18 cs. (cotton).

WRITING PAPER

D. F. Young & Co., Vasconia, Liverpool, 2 cs. (airmail).

TISSUE PAPER

Meadows Wye & Co., Vasconia, Liverpool, 3 cs.

WAFER PAPER

Delft Packing & Trading Corp., Westerdam, Rotterdam, 27 cs.

MISCELLANEOUS PAPER

American Express Co., Indochinois, Havre, 7 cs.

RAGS, BAGGING, ETC.

1st National Bank of Chicago, Exporter, Haifa, 435 tons Hessian rags.
R. Blank, Exporter, Alexandria, 61 bls. old white cotton rags.
A. J. Mafrige, Exporter, Alexandria, 184 bls. new khaki cuttings.
Chase National Bank, Tweedbank, Shanghai, 100 bls. cotton waste.
Lush Cotton Products Co., Inc., James M. Wayne, Liverpool, 50 bls. cotton waste.
Royal Manufacturing Co., James M. Wayne, Liverpool, 78 bls. cotton waste.
J. Eisenberg, Inc., James M. Wayne, Liverpool, 4 bls. wool thread waste.
Schimmel Trading Corp., White Swallow, Rio de Janiero, 166 bls. cotton waste.
Riverside Mills, White Swallow, Santos, 119 bls. cotton waste.
Williamson Products Co., White Swallow, Santos, 137 bls. cotton waste.
New England Waste Co., White Swallow, Santos, 176 bls. cotton waste.
Castle & Overton, Inc., White Swallow, Santos, 17 bls. worsted sweater clips.
Chase National Bank, Vasconia, Liverpool, 4 bls. new wool rags.
U. S. Commercial Co., Slemmestad, Istanbul, 706 bls. new cotton clips.
Atlas Waste Manufacturing Co., Coastal Captain, Havana, 16 bls. cotton waste.
Atlas Waste Manufacturing Co., Paraguay, Copenhagen, 21 bls. cell wool waste.

GLUESTOCK, ETC.

Polish Trading Co., Midland, Antwerp, 200 bags animal glue.
H. Remis, White Swallow, Santos, 67 rolls, 1 bl. gluestock.
Karr Ellis Co., Vasconia, Liverpool, 284 bags dry hide cuttings.
J. Gorvers, Coastal Captain, Havana, 167 bls. gluestock.

CASEIN

Bankers Trust Co., Rio Neuqueen, Buenos Aires, 500 bags, 25,000 kilos.

WOODPULP

Pagel Horton & Co., Inc., Oscar Borjesson, Gefle, 5,867 bls. woodpulp.
Perkins Goodwin & Co., Oscar Borjesson, Hernosand, 3,961 bls. half prime strong sulphite pulp.
J. Andersen & Co., Oscar Borjesson, Hernosand, 2,437 bls. half prime strong sulphite pulp.
Cellulose Sales Co., Oscar Borjesson, Hernosand, 1,920 bls. sulphite pulp.

ALBANY IMPORTS

WEEK ENDING OCTOBER 26, 1946

Pagel Horton & Co., Inc., Oscar Borjesson, Gefle, 2,540 bls. woodpulp.
Cellulose Sales Co., Oscar Borjesson, Hernosand, 360 bls. sulphite pulp.
J. Andersen & Co., Oscar Borjesson, Hernosand, 6,180 bls. sulphate pulp.
Cellulose Sales Co., Oscar Borjesson, Sandarne, 4,175 bls. air dry sulphate pulp.

Williams Visits Vancouver; Reports World Supply Low

VANCOUVER, B. C.—Jesse B. Williams, the representative in Johannesburg, South Africa for Pacific Mills Ltd., states Canada is the only country producing and exporting paper in quantity. Mr. Williams has completed a 25,000 mile tour of paper producing companies of the world. He states the United States is consuming all her own production while Scandanavian countries are unable to produce through lack of machinery. In Norway, he states, the Nazi occupational army took all supplies of wood pulp for use as explosives and animal fodder.

Finland, which occupied the position of one of the largest exporters of paper, is now commercially dead, he states, and 75 percent of all her manufactured products go to meet the $300,000,000 war reparations demanded by Russia. He spent two weeks in Finland, and found everyone there extremely depressed, and stated there was absolute economic domination by Russia.

As indication of the abundance of wood in Canada, compared to South Africa, he pointed to the size of Canadian matches. South African matches, he said, were very much smaller.

Powell River Names Harper To Its Research Council

VANCOUVER, B. C.—David Harper has now joined the Powell River Company as secretary of the company's Research Council and consultant on marketing economics and statistics.

Mr. Harper was born in Victoria, in 1916 and graduated with his Bachelor of Commerce degree in 1942 from the University of British Columbia. Prior to graduation he taught high school, specializing in commercial subjects. During the war he served overseas with the Seaforth Highlanders, and for the past year lectured at the University of British Columbia in economics and statistics.

Mr. Harper's new duties will include the co-ordinating of all research plans of the company—technical, economic, and marketing.

Weeks Record of Trends in The Pulp and Paper Market

Office of the PAPER TRADE JOURNAL, Wednesday, Oct. 30, 1946.

Demand for paper and paperboard continues to exceed supplies and the trade is expressing concern over the ability of the paper industry to carry its 1946 production rate of 19,000,000 tons into 1947. The domestic paper and paperboard industry as a whole has been operating at near-capacity levels and has produced to the maximum extent possible with available raw material supplies in terms of pulpwood and wood pulp. However, the actual tonnage could have been somewhat greater if adequate supplies of market wood pulp had been available to all mills depending upon purchased pulp. Any substantial increase in paper production beyond that margin would have to come from new capacity, some of which is now under construction. There is no definite information, however, as to the exact new capacity, especially in integrated operations, which may actually come into production within the next few months. In some quarters hope is still expressed for slightly over a million tons of new capacity before the end of 1946.

Several converting mills, reflecting the accumulated effect of inadequate supplies of market pulp and consequent reduction in inventories, have indicated that a further trend toward short-time operations is a certainty unless the supply pinch is removed. With some converting mills already on short-time operation, reports indicate that downgrading of quality and decreased production are to be expected to keep certain mills in operation. In the writing paper segment of the industry, with downgrading already carried as far as possible, reduced output is the only alternative. Even some self-contained mills might be obliged to ease their production pace, since few of them are absolutely self-supporting in each of the varieties of pulp necessary to their operation.

At a recent SAPI meeting, Mr. Ken Trowbridge of the American Pulpwood Association pointed out that increasing competition of other industries for the forests' wealth has been forcing the paper industry to use what was formerly considered poorer grades of woods, but necessity and technical research have operated to balance this tendency. The labor problem within the forest industries has been complicated by recent development of a migrant class of workers, lack of interest on the part of some timber-using industries in the welfare of their employees, and seasonal work in certain sections of the country. A misconception held by many people is that machine operations are a panacea for lowering costs and improving working conditions in the forest industries. Mr. Trowbridge is firmly convinced that the best fertilizer for the growth of trees is the $ (dollar sign). Only by making tree cultivation profitable can we really increase our timber lands. Meanwhile, pulpwood supplies throughout the country, with the exception of a few scattered areas, continued satisfactory through September with receipts during the first 8 months of 1946 exceeding those of the same period of 1945 by nearly 8 per cent. Should the present rate of increase be maintained throughout the remainder of the year, pulpwood receipts for 1946 will approximate 18,567,000 cords, a new high in annual receipts.

The index of general business activity for the week ended October 19 rose to 134.1 from 132.5 in the previous week, compared with 115.3 for the corresponding week in 1945. The index of paperboard production declined to 148.1 from 154.2 in the previous week, compared with 142.7 for the corresponding week in 1945.

Paper production for the week ended October 19 was estimated at 105.1 per cent, compared with 105.9 for the preceding week, with 96.5 for the corresponding week in 1945, with 92.7 for 1944, with 88.8 for 1943, and with 91.6 per cent for the corresponding week in 1942.

Paperboard production for the week ended October 19 was 98.0 per cent of capacity, compared with 99.0 per cent for the preceding week, with 96.0 for the corresponding week in 1945, with 94.0 for 1944, with 94.0 for 1943, and with 81.0 per cent for the corresponding week in 1942.

Old Rope and Bagging

Heavy demand continues for old rope with sisal collections about 70 to 80 per cent of the market, and Manila the remainder. OPA is now allocating shipments of Philippine and Central American damaged hemp, strings, etc., at 6.60c per pound to paper mills showing the greatest need. Manila is still 5.75c, sisal 4.75c, jute strings 5 to 5.50c, and paper strings 1.75c.

In the bagging market, No. 1 scrap burlap is steady at $4.50 to $4.75 delivered. Mixed bagging with mill run gunny commands $4.25. Some paper makers are reported taking Australian wool pouches at $4.75.

Wood Pulp

Production of wood pulp in the United States continued on a high level throughout September as reported by regional observers of the Department of Commerce. If the rate of increase of 8.5 per cent established in August this year over August 1945 is maintained throughout the remainder of the year, production may reach 10,500,000 tons, an annual record second only to the banner year of 1942.

Domestic pulp production for the first 7 months of 1946, totaling 910,000 tons, showed a small increase of 0.7 per cent over the same period of 1945. For the first time cumulative production for 1946 is above that for the comparable 1945 period. Over-all August inventories of wood pulp in relation to consumption are in only a slightly less favorable position than average inventories for the past 10 months.

Rags

Fine paper manufacturers are having difficulties obtaining new cotton cutting, and there are reports that certain high grades are being held back in anticipation of decontrol; while packers say they are shipping rags as fast as they can prepare supplies for mill consumption. Prices still hover around ceilings.

Old cotton rags remain in steady call. Paper mills are making greater use of old cotton stripped from mattresses to take the place of dwindling supplies of government subsidized raw cotton.

Waste Paper

Reopening of chain food stores last week helped to increase collections of container grades in the New York area. Demand for all grades is heavy, with more and more mills willing to pay the $2 per ton loading charge for car stocks loaded away from packers' warehouse.

Consumption of waste paper during the first 8 months of 1946 was greater than the comparable period of 1945 by 173,000 tons, or 3.8 per cent. Inventories for the first 8 months of 1946 were 62 per cent over the 1945 period. Still inventories have not been heavy enough to add to the average 13 day inventories at paperboard mills.

Solvay Soda Ash Bulletin Offered in New Edition

NEW YORK—Solvay Sales Corporation has announced a new edition of Solvay Technical & Engineering Service Bulletin No. 5, "Soda Ash." This new 64-page bulletin contains chapters on the properties of soda ash, bulk shipments, storage, conveying and elevating, unloading of bulk, unloading of bags and barrels, weighing, proportioning and feeding devices, sampling and analysis, precautions and conversion tables.

This bulletin is directed at the interest of both operators and technical men in industries using soda ash, and is offered by Solvay without charge upon request to any branch office of the Solvay Sales Corporation or to their Advertising & Sales Promotion Department at 40 Rector Street, New York 6, N. Y.

MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL,
Wednesday, October 30, 1946.

BLANC FIXE — Demand continues active as raw materials remain tight. Pulp is currently quoted at $40 per ton, in barrels, car lots, at works; the powder is currently quoted at $60 per ton, car lots, f.o.b. works.

BLEACHING POWDER — Shipments temporarily delayed due to drum shortage, supplies reported adequate to meet demand. Demand for export use reported steady. Quotations are unchanged. Prices on bleaching powder range from $2.50 to $3.10 per 100 pounds, in drums, car lots, at works.

CASEIN—Current prices on processed acid-precipitated casein are reported around 46 to 49 cents per pound for both domestic and Argentine grades; f.o.b. shipping point, with quantity not specified at the present time.

CAUSTIC SODA—Supplies tightest ever as market remains critical. Shipments are behind schedule as demand shows increasing strength. Cutback production further reduces stocks. Solid caustic soda is quoted at $2.30 per 100 pounds; flaked and ground is quoted at $2.70 to $3.95 per 100 pounds. All prices car lots.

CHINA CLAY—Supplies are becoming tighter as demand continues to increase for both domestic and English grades. Quotations remain unchanged. Domestic filler clay is currently quoted at from $8.50 to $9 per ton; coating clay is quoted at from $12 to $22 per ton, at mine. Imported clay is quoted at from $22 to $25 per long ton, ship side. All prices quoted in car lots.

CHLORINE—Demand continues to exceed output, market tight, stocks low. Tank car shortage delays shipments. Little or no improvement noted in container supplies. Quotations unchanged. Chlorine is currently quoted at $2.00 to $2.25 per 100 pounds, in single unit tank cars, f.o.b. works.

Rosin—Gum rosin in drums, per 100 pounds net, in yard, New York, B, $8.30; D, $8.30; E, $8.83; F, $9.13; G, H, I, K, M, N and WG, $9.22; WW, $9.25. All prices in car lots, rosin in bags 5c less.

SALT CAKE — Demand increasing with supplies showing some improvement. Prices remain unchanged. Domestic salt cake is quoted at $15 per ton in bulk, Chrome salt cake is quoted at $16 per ton. All prices in car lots, f.o.b. shipping point.

SODA ASH—Supplies continue short, demand active, previous orders filled. Export inquiry very heavy, Quotations continue unchanged. Current prices, car lots, per 100 pounds, are as follows: in bulk, $.95; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Supplies are showing steady improvement. Previous orders filled. Starch prices continue unchanged. The pearl grade is quoted at $5.87 per 100 pounds; powdered starch at $6.02 per 100 pounds; both prices in bags, car lots, f.o.b. Chicago.

SULPHATE OF ALUMINA—Demand active, supply fair. Quotations continue unchanged. The commercial grades are quoted at from $1.15 to $1.20 per 100 pounds, in bags, car lots, f.o.b. works. The iron free is currently quoted at $1.75 to $2.00 per 100 pounds, in bags, at works.

SULPHUR—Strong seasonal demand is reported with stocks plentiful. Annual contracts are quoted at $16 per long ton, f.o.b. mines; the price f.o.b. at Gulf Ports is $17.50 per long ton. Prices in car lots Sulphur prices decontrolled October 4.

TALC—Domestic and French grades are moving in fair volume with prices steady. Domestic grades are currently quoted at from $16 to $30 per ton at mines; Canadian at $24 to 30 per ton. All prices on car lots.

MARKET QUOTATIONS

All market quotations, excepting those otherwise designated as official OPA maximum prices, are based on the manufacturers' price level as of October 1-15, 1941; maximum wholesale prices are based on the merchants' maximum prices for stipulated quantities at a quoted price to all customers of a like class, as shown by the merchant's sales records of goods delivered during March, 1942. A merchant's price list in effect in March, 1942, showing quotations of actual shipments, will establish the current maximum prices.

Paper

(Delivered New York)

Standard News, per ton—
Roll, contract ....$84.00 @ —
Sheets ..... 93.00 @ —

Kraft—per cwt.—Carload Quantities
Zone A, Delivered
Superstandard Wrapping .....*$5.25 @ —
No. 1 Wrapping.. *5.00 " —
Standard Wrapping*4.75 " —
Standard bag.....*4.75 " —

* Prices for Standard Wrapping are for 40 lb. base weight; for Stndard Bag for 30 lb. base weight.

Tissues—Per Ream 24x36 (480) 10 lb. Zone 1.
Wh. No. 1 Frd. ... 1.10 @ 1.20
Wh. No. 1 M. G. .. 1.10 @ 1.20
Wh. No. 1½ ..... .95 @ 1.10
Wh. No. 2 ..... 1.00 @ 1.10
Wh. Anti-Tar. .... 2.25 @ 3.50
Kraft Unbl. ..... 1.15 @ 1.25
Manila No. 2 ..... .90 @ 1.05

Toilet—Per Case of 100 rolls 1 M Sheets.
Unbleached ..... 4.47 @ 5.50
Bleached ..... 6.50 " —

Paper Towels — Per Case of 3750 Zone 1.
Wh. C. fold 11x13½ 4.09 @ —
Br. Sgl. fold 10 in. 2.37 " 2.48
Br. M'tif'd 9½x14¾ 3.48 " —
Br. M'tif'd 9½x9¼ 2.37 " 2.48

Manila—per cwt.—C. l. t. a.
No. 1 Jute .....11.25 @ —
No. 1 Manila 35 lb. 6.00 " 7.00

Boards, per ton—
News .....*59.00 @ —
Chip .....*58.00 @ —
Sgl. Mla. Ll. Chip*67.00 @ —
White Pat. Coated*86.00 @ —
Kraft Liners 50 lb.*74.00 " —
Binders Boards... 84.00 " 116.00

* OPA Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5; basis 40-49, add $2.50; basis 91-100, add $2 50; basis 101-120, add $5.

The following are representative of distributors' resale prices, all deliveries in Zone 1:

Rag Content Bonds and Ledgers—White, Assorted Items

	Bonds	Ledgers
100% Rag Ext. No. 1	$39.75@$46.75	$40.90@$48.00
100% Rag.	32.85 " 38.50	34.00 " 40.00
85% Rag	.... "	30.55 " 38.75
75% Rag	24.30 " 28.50	24.45 " 30.00
65% Rag	.... "	.... " ....
50% Rag	20.05 " 24.50	21.25 " 25.75
25% Rag	17.85 " 21.75	19.00 " 23.25

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers.. White, Assorted Items

	Bonds	Ledgers
No. 1	$12.00@$14.50	$13.15@$16.00
No. 2	11.25 " 13.75	12.25 " 15.00
No. 3	.... "	.... " ....
No. 4	10.60 " 13.00	11.75 " 14.25

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper.
No. 1 Glossy Coated.. $14.70@$16.75
No. 2 Glossy Coated.. 13.75 " 15.50
No. 3 Glossy Coated.. 13.20 " 14.00
No. 4 Glossy Coated.. 12.80 " 14.90
No. 1 Antique (Watermarked) ..... 11.35 " 12.75
No. 2 Offset ..... 10.65 " 12.25
A Grade E. F. ..... 10.00 " 12.00
A Grade S. & S. C. .. 11.00 " 12.50
B Grade E. F. ..... 10.30 " 11.75
B Grade S. C. ..... 10.70 " 12.25
C Grade E. F. ..... 10.00 " 11.50
C Grade S. C. ..... 10.40 " 12.00
D Grade E. F. ..... 9.70 " 11.00
D Grade S. & S. C. .. 10.10 " 11.50
Ivory & India at $.50 cwt. extra.

Wood Pulp

OPA Maximum Prices and Canadian Manufacturers' Prices, Less Freight Not Exceeding OPA Allowances.

Bl. Softwood Sulphite	$103.50
Unbl. Softwood Sulphite	90.00
Bl. Hardwood Sulphite	100.50
Unbl. Hardwood Sulphite	87.50
N. Bleached Sulphate	103.50
S. Bleached Sulphate	97.00
N. Semi-Bleached Sulphate	98.00
S. Semi-Bleached Sulphate	91.50
N. Unbl. Sulphate	83.50
S. Unbl. Sulphate	76.50
Bleached Soda	93.50
Unbleached Soda	88.00
Groundwood	64.00
Ground—Machine Dried	67.00
Sulphite Screenings	50.00
Sulphate Screenings	44.00
Groundwood Screenings	37.50
N. Unbl. Sulphate Sideruna	83.50
S. Unbl. Sulphate Sideruna	76.50
Standard Newsprint Sideruna	64.00

Transportation Allowances

Applying to Producers of Wet Weed Pulp.

	Below 50% Air Dry Weight
Northeast	$12.50
Lake Central	12.50
Southern	15.00
West Coast (in area)	9.50
West Coast (out area)	15.50

	50%-80% Air Dry Weight
Northeast	$10.50
Lake Central	10.50
Southern	13.00
West Coast (in area)	8.50
West Coast (out area)	14.50

Applying to Producers of Dry Weed Pulp.

	Above 80% Air Dry Weight
Northeast	$7.50
Lake Central	7.50
Southern	10.00
West Coast (in area)	6.50
West Coast (out area)	12.50

Should freight charges actually exceed these allowances, the difference may be added to the maximum prices.

Domestic Rags

New Rags
(Nominal Prices Delivered at Mill + 5% Brokerage)

Shirt Cuttings—
New White, No. 1.. 7.25 @ Nominal
Silesias No. 1 .... 5.75 " "
New Unbleached .. 7.50 " "
Blue Overall ..... 5.50 " "
Fancy ..... 3.50 " "
Washables ..... 3.00 " "
Bleached Khaki Cutting ..... 4.25 " "
Unbleached Khaki Cuttings ..... 3.50 " "

Old Rags

White, No. 1—			
Repacked	3.80	@	Nominal
Miscellaneous	3.20	"	"
White, No. 2—			
Repacked	2.90	"	"
Miscellaneous	2.65	"	"
Thirds and Blues—			
Repacked	2.20	"	"
Miscellaneous	1.30	"	"
Roofing Rags—			
No. 1	1.55	"	"
No. 2	1.45	"	"
No. 3 (bagging)	1.35	"	"
No. 4	1.35	"	"
No. 5A	1.35	"	"
Old Manila Rope	5.75	"	"

Foreign Rags

(All Prices Nominal)

New Rags

New Dark Cuttings	6.00	@	Nominal
New Mixed Cuttings	6.50	"	"
New Light Silesias	5.75	"	"
Light Flannelettes	5.75	"	"
New White Cuttings	12.00-14.00		
New Light Oxfords			Nominal
New Light Prints	8.00-10.00		

Old Rags

No. 1 White Linens	8.50	@	Nominal
No. 2 White Linens	7.50	"	"
No. 3 White Linens			Nominal
No. 4 White Linens	3.25	@	Nominal
No. 1 White Cotton	4.75	"	"
No. 2 White Cotton	3.75	"	"
No. 3 White Cotton	3.00	"	"
No. 4 White Cotton	2.20	"	"
Extra Light Prints	2.40	"	"
Ord. Light Prints	5.50	"	"
Med. Light Prints	4.75	"	"
Dutch Blue Cottons			Nominal
French Blue Linens			Nominal
Checks and Blues	4.00	"	"
Linsey Garments	4.00	"	"
Dark Cottons	3.60	"	"
Old Shopperies	3.35	"	"
New Shopperies	3.50	"	"
French Blues			Nominal

BAGGING

(Prices to Mill, f.o.b. N. Y.)

Gunny No. 1—			
Foreign	4.00	@	Nominal
Domestic	3.30	"	"
Wool Tares, light	4.00-4.75		
Wool Tares, heavy	4.50	@	Nominal
Bright Bagging	3.50	"	"
Manila Rope—			
Foreign			Nominal
Domestic	5.75	@	Nominal
Jute Strings	4.50	"	"
No. 1 Sisal Strings	3.00	"	"
Mixed Strings	1.50	"	"

Waste Paper

Nominal Prices to Mills

(Dollars Per Ton)

F.o.b. New York, Baled

No. 1 Hard White Envelope Cuts, one cut	$67.50	@	—
No. 1 Hard White Envelope Cuts	62.50	"	—
No. 1 Hard White Shavings, unruled	57.50	"	—
No. 1 Hard White Shavings, ruled	50.00	"	—
Soft White Shavings, one cut	57.50	"	—
No. 1 Soft White Shavings	50.00	"	—
Soft White Shavings, Misc.	43.00	"	—
No. 1 Fly Leaf Shavings	33.50	"	—
No. 2 Fly Leaf Shavings	22.50	"	—
No. 1 Groundwood Fly Leaf Shavings	25.00	"	—
No. 2 Mixed Groundwood Fly Leaf Shavings	18.50	"	—
Mixed Colored Shavings	15.50	"	—
Mixed Groundwood Colored Shavings	18.00	"	—
Overissue Magazines	33.50	"	—
No. 1 Heavy Books & Magazines	38.50	"	—
Mixed Books	22.00	"	—
No. 1 White Ledger	46.00	"	—
No. 2 Mixed Ledger, colored	40.00	"	—
New Manila Envelope Cuttings, one cut	57.50	"	—
New Manila Envelope Cuttings	53.00	"	—
Extra Manilas	39.00	"	—
Mixed Kraft, Env. & Bag Cuttings	55.00	"	—
Kraft Envelope Cuttings	65.00	"	—
Triple Sorted, No. 1 Brown Soft Kraft	50.00	"	—
New 100% Kraft Corrugated Cuttings	45.00	"	—
No. 1 Assorted Old Kraft	35.00	"	—
New Jute Corrugated Cuttings	18.50	"	—
Old 100% Kraft Corrugated Containers	35.00	"	—
Box Board Cuttings	14.50	"	—
White Blank News	33.00	"	—
Overissue News	22.00	"	—
No. 1 News	20.00	"	—
No. 1 Mixed Paper	19.00	"	—
Old Corrugated	28.00	"	—
Mill Wrappers	22.00	"	—

Twines

All Prices Nominal

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.26	@	—
White Hemp	.26	"	—
Fine Polished—			
Fine India	.31	"	—
Unpolished—			
Box	.20¼	"	—
Paper Makers	.20	"	—
Tube Rope	.22	"	—
Wall Paper	.23½	"	—
Wrapping	.26	"	—
Soft Fiber Rope	.22	"	—
Cotton	.28	"	—

(Hard Fiber)

Medium Java	.23	"	—
Mex. Sisal	.21	"	—
Manila	.33	"	—

PHILADELPHIA

Domestic Rags (New)

(Price to Mill)

Shirt Cuttings—	
New White No. 1	.07¾
New White No. 2	.05¾
Light Silesias	.05¾
Black Silesias, soft	.03¾
New Unbleached	.07½
Washable Prints	.04¼
Washable No. 1	.03
Blue Overall	.05½
Cottons—According to grades—	
Washable Shredding	.01¾
Fancy Percales	.04¾
New Black Soft	.03¾
Khaki Cuttings—	
Unbleachable Cotton Cuttings	.03½
Bleachable Cotton Cuttings	.04¼
Men's Corduroy	.03½
Ladies' Corduroy	.03
Cottonades	.03¾

Domestic Rags (Old)

White No. 1—Repacked	3.80	@	—
Miscellaneous No. 1	3.20	"	—
Miscellaneous No. 2	2.65	"	—
White No. 2—Repacked	2.90	"	—
Thirds and Blues—			
Miscellaneous	1.80	"	—
Repacked	2.20	"	—
Black Stockings—			
(Export)			Nominal
Roofing Stock—			
Foreign No. 1			Nominal
Domestic No. 1	1.55	"	—
Domestic No. 2	1.45	"	—
Roofing Bagging	1.35	"	—
Old Manila Rope	5.75	"	—

Bagging

(F. o. b. Phila.)

Gunny No. 1—			
Foreign			Nominal
Domestic	3.00	@	3.50
No. 1 Clean Bright—Sisal Strings	.04	"	—
No. 2 Clean Bright—Sisal Strings	.03	"	—
Sisal Jute	.02½	"	.02¾
Scrap—			
No. 1	3.25	"	3.50
No. 2	1.75	"	1.80
Wool Tares, heavy	4.00	"	4.25
No. 1 New Light Burlap	3.00	"	4.00
New Burlap Cuttings	3.75	"	4.00

Old Papers

(F. o. b. Phila.)

OPA Maximum Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
Soft White Shavings, one cut	2.50	"	—
White Blank News	1.65	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
Hard White Envelope Cuts, one cut	3.37½	"	—
Triple Sorted No. 1 Brown Soft Kraft	2.50	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
White and Colored Tabulating Cards	2.25	"	—
Ground Wood Tabulating Cards	1.35	"	—
White Blank News	1.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.95	"	—
Overissue News	1.10	"	—
Box Board Cuttings	.72½	"	—
New Corrugated Cuttings, Kraft	2.25	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.40	"	—
Jute Corrugated Cuttings	1.07½	"	—

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign			(nominal)
Domestic	2.75	@	2.90
Sisal Rope No. 1	*4.75	"	—
Sisal Rope No. 2	* —	"	4.00
Mixed Rope	1.60	"	—
Transmission Rope—			
Foreign			(nominal)
Domestic	2.75	"	3.00
Manila Rope—			
Foreign			(nominal)
Domestic	5.75	"	—
Soft Jute Rope	4.50	"	5.00
Jute Carpet Threads	3.00	"	3.50
Bleachery Burlap	8.50	"	9.00
Scrap Burlap—			
Foreign			(nominal)
Domestic	3.00	"	3.25
South America	—	"	3.25

BOSTON

Old Papers

(F. o. b. Boston)

OPA Maximum Prices, Baled

No. 1 Hard White Shavings, unruled	2.87½	@	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
Hard White Envelope Cuts, one cut	3.37½	"	—
Triple Sorted No. 1 Brown Soft Kraft	2.50	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
White and Colored Tabulating Cards	2.25	"	—
Ground Wood Tabulating Cards	1.35	"	—
White Blank News	1.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.95	"	—
Overissue News	1.10	"	—
Box Board Cuttings	.72½	"	—
New Corrugated Cuttings, Kraft	2.25	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.40	"	—
Jute Corrugated Cuttings	1.07½	"	—

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign			(nominal)
Domestic	2.75	@	2.90
Sisal Rope No. 1	*4.75	"	—
Sisal Rope No. 2	* —	"	4.00
Mixed Rope	1.60	"	—
Transmission Rope—			
Foreign			(nominal)
Domestic	2.75	"	3.00
Manila Rope—			
Foreign			(nominal)
Domestic	5.75	"	—
Soft Jute Rope	4.50	"	5.00
Jute Carpet Threads	3.00	"	3.50
Bleachery Burlap	8.50	"	9.00
Scrap Burlap—			
Foreign			(nominal)
Domestic	3.00	"	3.25
South America	—	"	3.25
Misc.	2.15	"	—
No. 1 White Ledger	2.30	"	—
No. 2 Ledger, colored	2.00	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
Overissue Magazines	1.67½	"	—
New Manila Envelope Cuttings	2.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.95	"	—
Box Board Cuttings	.72½	"	—
Kraft Corrugated Cuttings	2.25	"	—
Old Corrugated Containers	1.40	"	—
Overissue News	1.00	"	—
No. 1 News	1.00	"	—

Waste Paper

(F. o. b. Chicago)

OPA Maximum Prices, Baled

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
No. 1 White Ledger	2.30	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
White Blank News	1.65	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
No. 1 Assorted Old Kraft	1.75	"	—
Overissue News	1.10	"	—
No. 1 News	1.00	"	—
No. 1 Mixed Paper	.95	"	—
No. 1 Roofing Rags	1.55	"	—
No. 1 Roofing Bags	1.45	"	—
Wool Tares—			
Foreign			(nominal)
Domestic	4.25	"	—
Aust. Wool Pouches	—	"	3.63
New Zealand Wool Pouches	—	"	3.39
New Burlap Cuttings	4.75	"	5.00
Heavy Baling Bagging	4.00	"	4.23
Paper Mill Bagging	2.50	"	3.00
No. 2 Roofing Bagging	1.35	"	—

* OPA Maximum Prices.

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.04½	@	.04¾
Fancy Percales	.04¼	"	.03
New White No. 1	.06¾	"	.07
New Light Flannelettes	.05½	"	.06
Canton Flannels, Bleached	.06	"	.06¾
Underwear Cutters, Bleached	.06¼	"	.06¾
Underwear Cutters, Unbleached	.05¾	"	.06
Silesias No. 1	.06	"	.06¾
New Black Silesias	.03	"	.03¾
Red Cotton Cuttings	.03½	"	.04
Soft Unbleached	.06½	"	.06¾
Blue Cheviots	.05½	"	.06
Fancy	.02¾	"	—
Washable	.02¾	"	—
Khaki Cuttings	.02¾	"	.03
O. D. Khaki	.03½	"	.03¾
Corduroy	.03¼	"	.03¾
New Canvas	.06¼	"	.06¼
B. V. D. Cuttings	.06¼	"	.06¾

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	3.80	@	—*
Miscellaneous	3.20	"	—*
White No. 2—			
Miscellaneous	2.65	"	—*
Twos and Blues, Repacked	2.20	"	—*
Old Blue Overalls	2.25	"	2.50
Thirds and Blues, Repacked	2.20	"	—*
Miscellaneous	1.80	"	—*
Black Stockings	3.50	"	4.00
Roofing Stock—			
No. 1	1.55	"	—*
No. 2	1.45	"	—*
No. 3	1.35	"	—*
No. 4	1.35	"	—*
No. 5, Quality A	1.35	"	—*
Quality B	1.20	"	—*
Quality C	.95	"	—*
Old Manila Rope	5.75	"	—*

* OPA Maximum Prices.

Foreign Rags

(F. o. b. Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

CHAS. T. MAIN, INC.
Consulting Engineers
201 Devonshire St., Boston, Mass.
PULP AND PAPER MILLS
Steam, Hydraulic and Electrical Engineering
Process Studies, Design, Specifications and Engineering Supervision
Reports, Consultation, and Valuations

HARDY S. FERGUSON & CO.
Consulting Engineers
200 FIFTH AVENUE, NEW YORK CITY
Hardy S. Ferguson.....Member A.S.C.E., A.S.M.E., E.I.C.
Hans H. Tenze.....Member A.S.M.E., E.I.C., A.S.C.E.
Consultation, reports, valuations, and complete designs and engineering supervision for the construction and equipment of
Pulp and Paper Mills and other Industrial Plants
Steam and Hydro-Electric Power Plants
Dams and Other Hydraulic Structures

Wide Experience
Meets Complicated Construction Problems with Assurance of Speedy, Economical Solution.
Merritt-Chapman & Scott Corporation
17 Battery Place, New York 4, N. Y.

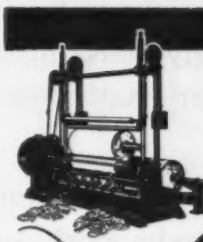
GEORGE F. HARDY
Consulting Engineer to the Paper Industry since 1900
441 Lexington Ave., New York 17, N. Y.
Member—Am. Soc. C. E.—Am. Soc. M. E.—Eng. Inst. Can.
Consultation — Paper and Pulp Mills
Reports — Hydro-Electric and
Valuations — Steam Power Plants
Estimates — Plans and Specifications

CAMACHINE 19 is a fast winder for newsprint, book and kraft mills, handling webs from 117" to 192".

GET FACTS!
WRITE FOR THIS FOLDER
CAMERON MACHINE COMPANY
61 POPLAR STREET - BROOKLYN 2, N.Y.

The Trade-Mark of
DEPENDABLE FELTS
The Waterbury Felt Co.
SKANEATELES FALLS, N. Y.

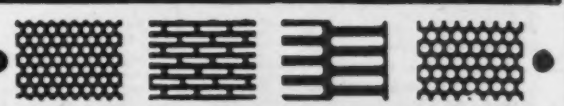
PAPER MILL AND PAPER BAG MACHINERY SINCE 1828
For the manufacture of high grade paper and paper products to meet the ever increasing and exacting demands for higher production and lower costs.
The **SMITH & WINCHESTER *Mfg.* Co.**
SOUTH WINDHAM • CONNECTICUT



Type AA—one of five sizes and types.
Langston
SLITTERS AND ROLL WINDERS
Reliability and accuracy are built-in qualities that "pay off" at high speeds.
SAMUEL M. LANGSTON CO.
CAMDEN • NEW JERSEY

PENNOTEX OIL CORPORATION
29 Broadway
New York, N. Y.
AMORPHOUS WAXES
Melting Points 120° F. to 205° F.
For the Manufacture of
LAMINATING PAPER . . GLASSINES . . WATERPROOFING . . GREASE PROOFING . . EXTENDERS FOR PARAFFIN, FOOD CONTAINERS, CONTAINER LININGS, ADHESIVENESS AND PROTECTIVE COATING.

SCREENS of Perforated Metal



The Harrington & King PERFORATING Co.
5652 Fillmore St., Chicago 44, Ill. 114 Liberty St., New York 6, N. Y.

The CLEARING HOUSE

Address replies to advertisements appearing under Box numbers in care of PAPER TRADE JOURNAL, 15 West 47th Street, New York 18, N. Y.

Copy for Classified Advertisements must be in our office on Monday preceding publication

HELP WANTED

HELP WANTED

HELP WANTED

SUPERINTENDENT FOR FELT MILL

We desire a man thoroughly experienced in making "Felt" for roofings or floor coverings.

This is a 70 Ton—single machine mill, located at Stockport, New York—eight miles from Hudson, New York. Nice company house provided free for living quarters. Former superintendent passed away.

An unusual opportunity because our company is fully integrated. We make both linoleums and roofings at our other plants.

Write, wire or phone to:

PRESIDENT,

BONAFIDE MILLS, INC.

295 Fifth Avenue, New York, 16, N. Y.

Telephone: Murray Hill 3-1570 O-31

PULP BLEACHING SPECIALIST

with twenty years of practical experience in the sulphite and sulphate industry of Canada, U. S. and Sweden wishes to associate with manufacturer of bleaching agents. Available June 1947. Salary $12,000. Address Box 46-758 care Paper Trade Journal. N-14

WANTED

Research and development chemist or chemical engineer for work in fields such as sizing, application of synthetic resins, etc. Graduate training and paper mill experience desirable. Responsible position with excellent opportunities. Address reply to Box 46-720 care Paper Trade Journal. O-31

SALARIED POSITIONS

$2,500-$25,000. This thoroughly organized consulting service of 36 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the caliber indicated. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
117 Dun Bldg., Buffalo 2, N. Y.

GENERAL SUPERINTENDENT WITH A COMPLETE KNOWLEDGE OF THE MANUFACTURE OF BOOK AND BOND GRADES OF WRITING PAPER. MUST BE THOROUGHLY COMPETENT, WITH HIGHEST RECOMMENDATIONS, FOR A SELF-CONTAINED MILL LOCATED IN NEW ENGLAND. ADDRESS BOX 46-744 CARE PAPER TRADE JOURNAL. O-31

GUMMING SUPERVISOR—Wanted by large well established paper converter. Should have practical experience in production of gummed paper and cloth tapes and gummed specialty papers. Give full details of qualifications and experience. Address Box 45-612 care Paper Trade Journal. D-19

WANTED—Superintendent for two Harper fourdrinier machine mill located in New York State making toilet tissue. Good opportunity for aggressive experienced man. In reply, please give references, salary expected and experience. Address Box 46-727 care Paper Trade Journal. O-31

CHARLES P. RAYMOND SERVICE, Inc.

294 Washington St., Boston, Mass.

Specializing in Paper Mill Personnel Positions Now Open.

Assistant superintendent or tour boss Fourdrinier machines, Mid-West
Chief engineer and electrician (Pennsylvania) $4,500 year
Chemists $4,000-6,000 year (New York State and Mid-West)
Power plant supervisor Southern States $90 week
Tour boss Fourdrinier machines, West Coast $4,400 year
Plant engineer (Canada) $400 month
Cylinder machine tender (Pennsylvania mill)
Carton estimator Mid-West $250-300 month
Mechanical engineers, draftsmen, designers and many others.

We invite correspondence (Strictly Confidential) with paper and pulp mill executives seeking new positions. O-31

PAPER EMBOSSING DEPT. FOREMAN

Excellent opportunity offered to experienced operator on Waldron or similar Paper Embossing equipment, to be Foreman in southern paper mill. Write, giving full details of experience, age, salary required. Box #46-762 care Paper Trade Journal. N-14

WANTED—TOUR FOREMAN

IMMEDIATE OPENING FOR A TOUR FOREMAN WORKING ROTATING SHIFTS.
ONE M. F. PICKUP AND ONE YANKEE PICKUP FOURDRINIER TISSUE MACHINES ARE OPERATING AT PRESENT. A THIRD HIGH SPEED TISSUE MACHINE WILL BE IN OPERATION IN LATE 1947.
WE PREFER A MAN 30-40 YEARS OF AGE WITH SOME TECHNICAL BACKGROUND. EXPERIENCE ON HIGH SPEED TISSUE MACHINES MAKING BOTH FLAT AND CREPED PAPERS DESIRABLE.
SEND COMPLETE RESUME GIVING EDUCATION AND EXPERIENCE TO

FERNSTROM PAPER MILLS, INC.
Pomona, California D-26

WANTED—3 Beater Engineers experienced on Kraft Papers—mill located in Northern part of Mexico. Address Box 46-736 care Paper Trade Journal. O-31

POWER PLANT SUPERVISOR—Experienced Boilers and Turbo-Generators. Under 40 years of age. Write, giving details of age, experience, education, salary desired. ORANGE PULP AND PAPER MILLS, INC., Orange, Texas. O-31

MACHINE DESIGNER:—Graduate Mechanical Engineer or equivalent. Should have experience with web printer and bag making machinery. Permanent position in large midwestern plant manufacturing printed and converted food packages. Real opportunity for one who has creative ability. Reply to Box 46-738 care Paper Trade Journal. N-14

WANTED—Research and development chemist or chemical engineer for work in fields such as sizing, application of synthetic resins, etc. Graduate training and paper mill experience desirable. Responsible position with excellent opportunities. Address reply to Box 46-740 care Paper Journal. N-7

SUPERINTENDENT for specialty bag plant, Philadelphia. Good opportunity for the right man. Replies confidential. Address Box 46-741 care Paper Trade Journal. O-31

WANTED—Experienced Master Mechanic for board mill in New England. State experience, salary and availability. Address Box 46-742 care Paper Trade Journal. N-7

"NOW I'VE SEEN EVERYTHING!"

Install Miami vertical pumps . . . and they'll run—*without periscopes.* They're built to operate even under flood conditions, the drive atop these pumps being totally enclosed and water-tight. Mills periodically afflicted with flood water, take note. Mills hard pressed for room should also take note, for these pumps require very little room.

Address inquiries to Shartle division.

SHARTLE BROS. MACHINE CO.
MIDDLETOWN, OHIO
DILTS MACHINE WORKS, Fulton, New York
Divs. of The Black-Clawson Co., Hamilton, Ohio

SHARTLE-MIAMI VERTICALS

- Verticals to handle water, white water, liquids.
- Verticals to agitate chests.
- Vertical Agi-Flo circulating agitators.
- Sump pumps.

HELP WANTED

PULP MILL SUPERINTENDENT WANTED BY SOUTHERN KRAFT MILL — Must have technical education and practical experience. 30-38 years of age. Send detailed information to Box 46-735 care of Paper Trade Journal, including education, experience and salary desired. O-31

WANTED—Progressive Mill with expansion program under way is in need of a man familiar with the receiving and handling of paper stocks and pulps used in the manufacture of Folding Boxboards. Excellent opportunity for the right man. Address Box 46-746 care Paper Trade Journal. N-14

SALES AND SERVICE ENGINEER to call on trade regularly at least every three months to check on operation of pulp and paper mill equipment for maintenance, sales of repair parts, etc. Must have had shop and mill experience. Address Box 46-757 care Paper Trade Journal. N-7

CHEMIST OR CHEMICAL ENGINEER — New York City location. Young man, preferably with training and some experience in pulp and paper making for laboratory and development work in semi-chemical pulping. Send complete information in first letter. Address Box 46-760 care Paper Trade Journal. N-21

SITUATIONS WANTED

ENGINEER-OPERATOR

With wide experience in stock preparations, mill design and operation for specialty papers and for board.

Can select most efficient equipment and supervise layout to make high grade wall board from many kinds of wood.

Box 46-672 care Paper Trade Journal. O-31

CHEMIST
College Graduate

With 10 years experience in operations in Rag pulp mills and in bank note, bond, carbon, cigarette, stationery and resin treated papers. Special studies and operation on cooking, bleaching and stock preparation of cotton, hemp and flax fibers. Familiar with stationery converting problems. At present employed but desire position with future. Foreign positions acceptable. Available for personal interview within reasonable distance. Address Box 46-737 care Paper Trade Journal. N-7

PLANT MANAGER—Thorough experience in converting paper and boards; wants change to position offering better opportunity. Excellent production and labor relations background. Address Box 46-694 care Paper Trade Journal. O-31

SITUATIONS WANTED

MANAGER — Controller etc. can handle all phases of the raw stock or converting end of the paper business. Address Box 46-734 care Paper Trade Journal. N-7

BAG MACHINE ADJUSTER—20 years' experience on flat and square, satchel bottom, coffee bags, cellophane, heat sealing machines and sealine printing. Wants change to position offering better opportunity. Middle west or west preferred, but not essential. Address Box 46-749 care Paper Trade Journal. O-31

POSITION WANTED—General Superintendent or Superintendent. Can produce quantity with quality on cylinder products. Understand present day personnel relations for highest efficiency. Training covers technical as well as the practical. Address Box 46-767 care Paper Trade Journal. N-7

FOR SALE

PAPER COATING MACHINERY — Waxing, Oiling, Gumming, Gluing, Carbon, Laboratory Coating and Treating Machines. High speed New improvement. MAYER MACHINE COMPANY, Inc., 1155 Scottsville Road, Rochester, N. Y. 17

FOR SALE

BEATERS
1—2000 lb. Holyoke-Iron Tub Beater.
2—1200 lb. E. D. Jones (no tubs).
1—1000 lb. Dayton Beater (no tub).
1—400 lb. Gavit—iron tub beater.
1—Breaker Beater—Dilts Bandless Roll 62" diameter x 54" face—70 tons daily capacity. Equipped with Shartle Bros. Ragger.

BLOWERS
2—Buffalo Forge Company—Size 7—Duplex Conoidal steel plate Blowers. Ball bearing.

CALENDER STACKS
1—5 roll 84" face—Farrel.
1—6 roll—72" face.
1—7-roll 36" Holyoke Machine. (supercalender)

CENTRAP
1—Shartle Brothers Centrap.

COATING MACHINE
1—26" six roll coating machine.

CYLINDER MOULDS
1—30" diameter x 74" face.
2—30" diameter x 54" face.
1—38" diameter x 75" face.
1—36" diameter x 84" face.
1—36" diameter x 80" face.
2—36" diameter x 72" face.
4—30" diameter x 72" face.

DOCTORS
14—Dillon Doctors—complete with accessories—98" face.

DRIVES
4—Smith & Winchester Drives.
1—Moore & White mortise gear drive.
1—D. O. James 75 H.P. Speed Reducer with couplings and motor base. Ratio 2.16 to 1. 900 RPM.
1—#7½ Reeves.

DRYERS
16—36" diameter x 115" face.
1—28" diameter x 76" face.
1—48" diameter x 94" face.
1—24" diameter x 84" face. (Baby)
8—36" diameter x 64" face, with frames gears and bearings.
2—25" x 120" (Baby Dryers).
1—48" x 100".
1—36" diameter x 38" face.

ERKENSATORS
1—I. W. E. Erkensators—bronze construction—complete with motors, starters and distributing box

FLAT SCREEN
1—4 plate Flat Screen.

HYDRAULIC PRESSES
1—Lake Erie Engineering Co., 78 ton, platen 12" x 12".
1—Watson Stillman, 60 ton, platen 14" x 14", with triplex pump and motor.

JORDANS
1—#2 Emerson, with 125 h.p. motor.
2—Noble & Wood, Pony Monarch, Belt Driven.
1—No. 2 Miami Jordan.
1—No. 9 Emerson Jordan—for direct connection to a motor.
1—Noble and Wood, Monarch, new fillings.

MOTOR
1—25 h.p. motor, including starting equipment.

PULP EQUIPMENT
1—32" three pocket Glens Falls Grinder (for 27" wood).

PULP SCREEN
1—IMPCO centrifugal pulp screen design No. 3.

PULPER
1—Jones Pulper.

PULVERIZER
1—Erie coal pulverizer.

PUMPS
1—Buffalo Pump—5500 g.p.m. direct connected to 100 H.P. Motor (50' head).
Various sizes of Centrifugal and Plunger Pumps. Write us regarding your particular requirements.

RAG CUTTER
1—#20 Taylor, Stiles & Co.

REDUCERS
1—Westinghouse Gear Motors—25 h.p.—115 output r.p.m.—3/60/440.

REELS
1—72" Downingtown Expansion Reel.
1—2 Bowl Reel — 112" face — bowls 30" diameter.
1—2 Bowl Reel—110" face.

ROLLS
500—Brass tube—steel tube—rubber covered iron rolls—various sizes.

ROTARY SCREENS
3—Moore & White Rotary Screens (alternating diaphragm type).

SAVEALL
1—Saveall 36" diameter x 96" face cylinder mold. (With iron end vat.)

SCREEN PLATES
36 plates—43 x 11 1/16"—.050 cut—bevel edges.
24 plates—Recently recut .008.
12 plates—Recently recut .035.
Also other sizes and cuts in stock.

SHREDDERS
1—No. 25 CRSE Mitts & Merrill Hog.
1—Gilman Shredder.
1—Waterville Shredder.

SHEETERS
1—128" Moore & White Sheeter with layboy.
1—48" Langston heavy duty chopper (this is a combination machine, combining a slitter, scorer, sheeter and chopper.)

SLITTERS AND WINDERS
1—72" Langston.
1—36" Beck Razor Blade type Slitter & Winder.
1—60" Moore & White Slitter and Winder set for 5/8" slits.
1—60" Moore & White Slitter and Winder set for 7/16" slits.
1—120" Moore & White 4 drum slitter.

STOCK PUMPS
1—7¾ x 12 duplex Moore & White.
1—12 x 20 Triplex Shartle.
1—8 x 18 Duplex Friction Co.
1—10 x 12 open impeller. (All lead).
Numerous other Centrifugal Stock Pumps. Advise us to your requirements.

SUCTION BOX
1—Nash 100" face Suction Box.

SUCTION FELT ROLLS
2—Downingtown Suction Felt Rolls—(10" diameter x 101" face and 10" diameter x 107" face).

TOILET AND TOWEL MACHINES
1—65" Towel Machine.
1—85" Toilet Machine.

V-BELT DRIVES
1—{23" diameter x 14" face, 10 grooves.
{15" diameter x 14" face, 10 grooves.

VACUUM PUMPS
1—#6 Nash Hytor.
2—#4 Nash Hytor.
1—No. 7 Sturtevant Vacuum Pump.

WET MACHINE
1—74" Moore & White.

We are always in the market to purchase your surplus or idle machinery. What have you to offer? Wanted Cylinder and Fourdrinier Machines (complete mills).

Paddy Ross, Pres. **J. J. ROSS COMPANY** Ben Kurs, Treas.

250 Frelinghuysen Ave. **Tel.—Bigelow 3-3720** **Newark 5, N. J.**

TELEPHONE
HUMBOLDT 2-2177

CABLE ADDRESS: JACK ROSS

ROSS PAPER MACHINERY CO.

265 PASSAIC STREET
NEWARK 4, N. J.

CONVERTING
PAPER MAKING EQUIPMENT

NEW, USED, REBUILT
PAPER AND PULP MACHINERY

JACK ROSS, President

BANBURY MIXER—1 Farrel Birmingham 16", complete. Photograph on request.

AIR HOISTS
2—Two-Ton Ingersoll Rand
2—Five-Ton Ingersoll Rand

BEATERS
2—1000 lb. Horne Iron Tub.
2—1200 lb. E. D. Jones Iron Tub Beaters with washers.
2—1200 lb. E. D. Jones Beater—no tubs.
3—Valley Iron 750 lbs. Iron Tub Beaters, with Silent Link Belt Drive.
1—1200 lb. Noble and Wood—no tub. Spare new fillings for roll.
2—Valley Iron—Roll 67" diameter x 60" face—wood tub.

BIRD SCREEN PLATE
17 Plate—60 cut. New condition.

BLEACHERS
2—Fletcher high density bleachers—used 3 months.

BLOWERS
1—American ball bearing blower, size 17" x 23" for motor drive.
1—American Blower, size 40. For belt drive.

CALENDER DOCTORS
1 set of 16 Warren Doctors 104" face with frames.
60 Warren Doctors—various sizes.

CALENDER ROLLS
36 rolls various sizes

CALENDER STACKS
2—2 roll Holyoke 36" face.

CONVERTING EQUIPMENT
1—Sanitary Napkin Machine. With motors and controls.
1—Miss Double Head Stitcher.

COUCH ROLLS
2—18" diameter x 92" face—brass covered.
2—20" diameter x 92" face—brass covered.

CYLINDER MOLDS
2—Impco—84" face—40" diameter with stainless steel face wire
2—[illegible]" face x 36" dia.
4—84" face x 36" diameter.
1—84" x 36"—with ball bearing and cast iron end vats.

DANDY ROLLS
2—122" face 10" dia.
1—120" face 12" dia.
1—120" face 9½" dia.

DRYER DOCTORS
40—Warren Doctors. Various sizes.

DRYERS
36—48" Dia. x 48" Face, Chromium Plated.
2—24" Dia. x 48" Face
13—120" face x 48" diameter—New
1—100" face x 48" diameter—with ball bearing.

ELECTRIC HOIST
1—Sprague Electric 3 ton hoist—5 h.p. 3 phase—60 cycle—110 volts.

FLAT SCREENS
3—Harmon 16 plate.
1—Sandy Hill 2 plate flat screen.

FOURDRINIER SHAKES
1—Beloit Fourdrinier Shakes.
1—Sandy Hill Bertram Shake. Late type.

FOURDRINIER WET END
1—120" Beloit Fourdrinier Wet End.
1—74" Pusey & Jones Wet End.

GRANITE ROLLS
2—112" face 20" diameter.

HAMMERMILLS
1—American Hammermill—37" anti friction bearing equipped.
1—Williams 18" Hammermill Ball Bearing.

HOG
1—Mitts & Merrill Hog. Number 5252.

JORDANS
1—E. D. Jones Majestic Jordans.
1—E. D. Jones Imperial Jordans—belt driven.
1—Smith & Winchester 30 ton capacity—belt driven.

KNOTTERS
1—Wells Knotter.
2—Trimbey Knotters.

LINE SHAFT
1—Complete line shaft with pulleys and pillar block.

PLATERS
2—Holyoke 2 Roll 18" dia. 36" face.

PULLEYS
60—Cone Split and Solid Cast Iron Pulleys. Various Sizes.

PULP EQUIPMENT
1—125" face Kamyr Press.
1—84" Sumner Disc Barker with motor.
1—84" Carthage 4 knife chipper, 3 sets spare knives with one Waterville Rechipper.

PULPERS
1—Voith Pulper 20 tons cap.
1—Bird Pulper.

PUMPS
4—Ingersoll Rand 250 g.p.m. 1740 rpm 90' head—4" suction—3" discharge. Direct connected to 10 hp. General Electric 220-440 volt—3 phase—60 cycle motor.
4—Ingersoll Rand 500 g.p.m. 1745 r.p.m.—80' head—4" suction—3" discharge. Connected to 15 h.p. General Electric 220-440 volt—3 phase—60 cycle motor.
4—Worthington Pumps 18,000 g.p.m.—38' head. Requires 75 h.p. at 550 r.p.m.
1—DeLaval 8" x 6".
16—Warren Vertical Pumps. 6" suction. 3" discharge. 135 g.p.m. 80' head. Direct Connected 6 h.p. General Electric motor. 1750 r.p.m. 440 volts. 3 ph.-60 cycle, ball bearing.
2—Worthington 3" 2 stage, 200 g.p.m. 224' head. Bronze Ball Bearings.
1—Worthington 400 g.p.m. 33' head 1750 r.p.m. Ball bearing.
1—Gould Figure 3000—size 8-4" suction—3" discharge.
1—American Marsh 200 g.p.m.—50' head—3" suction 2½" discharge. Connected to 7½ h.p. G.E. motor—230 volts.
1—Pennsylvania 1000 g.p.m. 80' head—8" suction—6" discharge—Connected to 30 h.p. G.E.—220 v. 3 phase—60 cycle motor.
8—De Laval Verticals—540 g.p.m. 1740 r.p.m.—30' head 5" x 5". Direct connected to 7½ h.p. Allis Chalmers Motor. 440 volts—3 phase—60 cycle.
1—Buffalo 100 g.p.m. 15' head—4½" suction—2½" discharge. Direct connected to 2 h.p. Star Electric Motor. 440 volts—3 phase—60 cycle.
1—6" Pusey & Jones Open Impeller Centrifugal Stock Pump—belt driven.
1—7" Pusey & Jones Open Impeller Centrifugal Stock Pump—belt driven.
1—Worthington 750 g.p.m. 120# head.

REFINERS
1—Weiner Refiner 24" with extended base for direct connection to motor.

ROLLS
40—Table, Dress, Felt, Wire, Breast and Calender Rolls. Various Sizes.

ROTARY COOKER
1—Rotary Cooker—8' dia. x 21' long—complete with drive.

ROTARY SCREENS
2—#2 Bird with copper vats.
2—#1 Bird with steel vats, lead lined.
4—Moore & White.

RUBBER PRESS ROLLS
1—119" Face—19½" Diameter.
1—109" Face—17½" Diameter.
1—120" Face—19" Diameter.
1—118" Face—18" Diameter.
1—120" Face—18" Diameter.
1—107" Face—18" Diameter.
1—106" Face—18¼" Diameter.

SAVEALLS
1—A. D. Wood cylinder 48" dia. 90" face.

SCREW PRESS
1—Valley Iron Screw Press. Used 2 years.

SHEETERS
1—96" Hamblet Duplex.
1—90" Beloit Single Knife heavy duty.
1—136" Hamblet Duplex.

SHREDDERS
2—24" Sprout Waldron heavy duty shredders—anti friction bearing equipped.
1—Taylor Stiles Portable Pulp Shredder—on wheels.
1—Rythor and Pringle Shredder.

SLITTERS AND WINDERS
1—82" Warren two drum—fully rebuilt.
1—84" Waldron Slitter and rewinder. Roll embossing attachment.

STEAM LOCOMOTIVES & WOODLAND EQUIPMENT
1—32 ton 36" gauge Shay-Lima locomotive. Air pressure 150 lbs. P.S.I. with a large lot of new spare parts.
1—40 ton 36" gauge Improved Climax Locomotive. Boiler pressure 150 lbs. P.S.I. with a large lot of new spare parts.
30—30" gauge wood cars. 40,000 lbs. log or pulpwood capacity. Used 4 months.
1—Sheffield motor car, manufactured by Fairbanks Morse—36" gauge—New.

THICKENERS
1—Thickener Cylinder Mold 36" diameter x 90" face—ball bearing equipped.
Iron end vat—16" diameter couch.

SUPERCALENDER STACKS
1—8 roll Norwood 52" face. Bottom roll 24" diameter. Top roll 20" diameter.

STOCK PUMPS
2—8 x 18" Beloit Duplex.

TURBINES
1—Westinghouse 125 h.p. 125 steam pressure—15 back pressure. Complete. Used 1 year.

TURBINES—PAPER MACHINE DRIVE
2—General Electric Turbine Paper Machine Drive 250 h.p.—350 r.p.m. 125 lb. steam pressure 30 lb. back pressure.

UNWINDERS
1—42" John Waldron Unwinder. Used 1 year.

VACUUM PUMPS
2—14" x 20" Connersville.

YANKEE DRYERS
2—Beloit 8' dia. x 175" face—75# working pressure.
1—Beloit 5' dia. x 194" face—75# working pressure.

THE ABOVE IS A PARTIAL LIST OF EQUIPMENT OFFERED FOR SALE.

NO CONNECTION WITH ANY OTHER FIRM OF SIMILAR NAME.

FOR SALE

FOR SALE

3 Terry Steam Turbines
Immediate Delivery

1—75 H.P. Variable Speed—Type G. R.P.M. 3850—90# Steam Pressure 15# Back Pressure—Type O Gear Box—Pinion 3850 R.P.M.—Gear 655 R.P.M.

1—100 H.P. Constant Speed — Type G 4008 R.P.M. 125# Steam Pressure # Back Pressure—Type O Gear Box —Pinion 4008 R.P.M.—Gear 775 R.P.M.

1—200 H.P. Constant Speed—Type G.A.T. 120# Steam Pressure—5# Back Pressure Type Q Gear Box—Pinion 4276 R.P.M.—Gear 720 R.P.M.

These turbines are in excellent working condition and may be inspected at
PRAIRIE STATE PAPER MILLS
Middletown, Ohio
N-7

REVAMPING AND REBUILDING MILL AND CAN OFFER FOR SALE

1—Noble & Wood Mammoth Jr. Jordan ¼" Filling. Now operating.
1—Brass covered finishing press roll—17⅝" diameter x 89½" face, complete with bearings and Noble & Wood friction drive.
1—4000# Capacity motor driven freight elevator with automatic stop control—can be inspected in operation at our plant.
1—8" Lawrence Centrifugal Water pump.
2—6" Barnes Centrifugal Sewage Pumps.
8—100" Screen plates for No. 2-A Bird Screen. Slots. .022—never used after being recut once.
1—Rubber covered press roll 12" diameter by 68" face—Journals 5" diameter by 7¼" long.
1—Rubber covered press roll 12" diameter by 84¼" face—Journals 5" diameter by 7¼" long.
1—20" face cast iron tapered pulley—2 15/16" Bore, Taper 31"-29½".
2—20" face cast iron tapered pulley—3 7/16" Bore, Taper 31"-30".
1—24" face cast iron tapered pulley—3 7/16" Bore, Tapered 31½"-29½".
2—Steel split pulleys 60" diameter by 31" face —5 15/16" bore.
1—Cast iron split pulley—60" diameter by 21" face by 3½" bore.
1—Cast iron split pulley—40½" diameter by 21" face by 3½" bore.
1—Cast iron split pulley—84" diameter by 36" face by 5 15/16" bore.
1—Cast iron split pulley—72" diameter by 10" face by 10" face by 8¾" bore.
2 —Steel split pulleys—60" diameter by 41" face by 5 15/16" bore.
1—Paper pulley—24" diameter by 21" face by 4⅝" bore.
1—Tapered cast iron split pulley. Taper 30" to 28½" by 20" face by 5 15/16" bore.
1—30" x 90" Cylinder mould—7" diameter shaft inside cylinder.
1 9⅝" diameter x 85" Face Rubber-covered squeeze or wringer roll-Journals 1 15/16" diameter.
1—9" diameter x 88" Face Calender roll—9" diameter journals.
18—24½" dia. x 92" face steel drier felt rolls with 1 7/16" x 6½" Journals.
3—4" Gould centrifugal stock pumps with 2 vane open impeller. Capacity 600 G.P.M. at 40' head—1175 R.P.M. with 10 H.P. Operated less than two years.
2 —Pair Noble & Wood lighter stands complete with lighter beams and bearings for 9" diameter journal beater roll.

A visit to the mill would prove profitable as we have many items for sale too numerous to mention. See our superintendent, Mr. O. P. Fussell at our plant in Walloomsac, N. Y.

WALLOOMSAC PAPER MILLS, INC.
Mills: Walloomsac, New York
Main Office: 25 Vanderbilt Avenue
New York 17, N. Y. TF

FOR SALE
BREAKER BEATER

1—Dilts Bandless Roll 62" diameter x 54" face—70 tons daily capacity. Equipped with Shartle Bros. Ragger.

J. J. ROSS COMPANY
250 Frelinghuysen Ave., Newark 5, N. J.
Tel. Bigelow 3-3720 O-31

FOR SALE—30" roll to roll embosser leatherette design. Address Box 46-763 care Paper Trade Journal. O-31

FOR SALE

FRANK H. DAVIS CO.,
ESTABLISHED 839
USED AND REBUILT PAPER MACHINERY.

FOR SALE

BEATERS
2—Holyoke 66 x 60 iron tub
1—Holyoke 48 x 44 iron tub
1—Horne patent beater 60 x 60, bronze bars
1—2000 lb. Horne iron tub new 1941, bandless roll 60 x 48
CALENDERS
1—52" Textile seven roll supercalender
1—43" Holyoke seven roll supercalender
5—Paper rolls 76 x 15¾ Jour. 7¾ x 13¾"
CUTTERS
1—110" Hamblet duplex sheet cutter
1—84" Clark with Moore & White layboy
1—Taylor Stiles rag cutter
2—No. 2 Daniels rag cutters
1—63" Smith & Winchester undercut ream cutter
1—115" Single knife Moore & White cutter and slitter, also layboy
DECKERS
1—30 x 95" Black & Clawson
1—30 x 74" Impco
3—Apmew filters, mould 50 x 100"
DRIVES
6—Beloit 14 & 63 teeth
7" face C O mortise gears
DRYERS
1—8 ft. x 86"
2—8 ft. x 175"
1—6 ft. x 102"
1—5 ft. x 194" new 1939
1—6 ft. x 106"
DUSTERS
1—four cyl. R.R.
1—Devil
FANS
Two—Buffalo double turbo 6½ conceidal forced draft fans
ENGINES
1—Hamilton Corliss 10 x 30 direct connected to 30 KW Westinghouse engine generator including exciter, balance wheel 10 ft. x 11"
1—10 x 10 American Ball twin variable speed, 100 HP excellent condition
FOURDRINIER PARTS
1—119" x 54' 10" wire
Rice Barton anti friction equipped 18" breast and 18" suction couch, now running
1—120" x 75 ft. wire Horne new 1927, anti friction equipped 25" suction couch and Bellit oscillating suction boxes. Also two sets Horne heavy presses with 20" dia. rolls. Now running 450 FPM
1—133" x 61' 2" wire Pusey & Jones, plain couches, running at 500 FPM
1—100" x 31 ft. special with two Reeves drives
1—72" Sandy Hill
1—120" Voith inlet
2—Sets 10" slices
FILTERS OR DE-INKERS
1—Apmew three cylinder, mould 50 x 100", worm gear drive
MIXERS AND COOKERS
1—25 gallon cooker, No. 75
PULPERS
1—No. 1 Lannoye
2—Jones with Falk reducers and motors 440 volts 3 ph sixty cycle
PUMPS
1—10 x 10 Bellit triplex
2—10 x 12 Deane rebuilt
1—Ingersoll Rand Pump, type Imperial 10
REELS
1—Two bowl Beloit, drums steel 16 x 123, slip belt drive
SCREENS
2—No. 2A Bird
2—No. 2 Bird
1—Moore & White No. 3
1—Jones Leith Walk
2—12 plate Packer
4—New 10 plate Witham vats
SHREDDERS
2—Mitts Merrill No. 15 CF direct cont. to 125 HP 440 volt motor
1—Carthage
Mitts Merrill type 14A F E S No. C 19026
SORTING TABLE
1—Moore & White sorting table
SLITTERS AND WINDERS
1—150" Moore & White four drum
1—120" Kidder two drum
1—114" Moore & White winds 60" roll
1—84" Bagley & Sewall
1—50" Cannard
1—26" Kidder two drum
1—30" Langston
WASHERS
2—2000 lb. Union Machine steel tub
Apmew three cylinder
WET MACHINES
1—84" Noble & Wood, automatic cut off Bottom roll R.C. 24 x 88"

Builders of
ASPHALT COATING, COMBINING MACHINE, GUMMING AND CREPING MACHINE, ROLL GRINDER
FRANK H. DAVIS COMPANY
175 Richdale Ave., Cambridge, Mass. TF

FOR SALE

MACHINERY FOR SALE

2—Impco Pulp Screens of design No. 2.
2—Sould, size 8", double suction centrifugal pumps mounted on baseplates but without motors. These pumps are Fig. 3460, rated 2000 GPM at 36 ft. head and requiring a 15 HP 1200 RPM motor. One pump is new and one pump is slightly used but in good condition.
3—Garanas Oyster-pail machines, hopper feed.
2—Garanas Batter-dish machines, hopper feed.

STEVENS & THOMPSON PAPER COMPANY
Greenwich, New York TF

FOR SALE

New brass covered felt or wire rolls 6¾" dia., 84 to 128" face. These are made from government surplus and are new in all respects.

Osborne Paper Mill Equipment Co.
Pulton, N. Y. TF

FOR SALE
PAPER MACHINE STEAM TURBINE DRIVE

230 H.P. Terry GA Turbine and Gear connected to 24" diameter pulley all on one solid base. Steam inlet 190 pounds. Back Pressure 25 pounds.
With Woodward Governor for speed control through wide range.
This unit is in excellent mechanical condition and a fine buy for anyone needing a paper machine drive for immediate shipment.

FERNSTROM PAPER MILLS, INC.
POMONA, CALIFORNIA TF

GOOD VALUES FOR THE PAPER MILL

68" Rice, Barton, Fales Slitter-Rewinder.
80" and 110" Mill Type Sheeters.
34" Inman Slitter.
54" Brown & Carver Power Cutter.
72" Cameron Rewinder.
36" Burton Slot-hole Perforator.
2—14" x 22" John Thomsons.
Robinson Double Corner Cutter.
American heavy duty Cross-Cut Saw.
Baling Presses—NEW—Hand and Power.

THOMAS W. HALL COMPANY, INC.
120 West 42nd St., New York 18

1—54" Seybold Holyoke Mill Type Cutter. Independent, automatic clamp. Flat Power Back Gauge. 5 h.p. a.c. motor. Rebuilt and guaranteed.
1—40" Model B Light Duty Fales Slitter and Rewinder. Complete knife setups. For ¾", ⅞" and 1".
1—Modern Clipper Cellophane Bag Machine.
1—68" Type 40B Hudson Sharp Toilet Paper Converter. Perforates 5" lengths toilet or 10" paper towels.
1—Noble & Wood Pony Jordan with extra new filled plug. ⅛" steel fillings.
1—Knowlton 46B double belt spiral tube winding machine with 10 HP motor and variable speed drive.
1—Hudson Sharp Facial Tissue Converting Machine 45" wide for embossing, slitting and rewinding folded facial tissue. Complete with AC motor equipment.
4—Complete spiral tube winders with automatic cut-offs, also recutters. 2 Langston and 2 Knowlton manufacture.

GIBBS-BROWER COMPANY, INC.
21 East 40th St., New York 16, N. Y. TF

FOR SALE—One Meisel Press, Factory No. 418. Reconditioned. Can be inspected in Chicago. Write: Tomahawk Kraft Paper Co., Tomahawk, Wisconsin. N-7

FOR SALE—Knowlton Spiral Winder complete with motors, tube cutters, roll slitter and other paper tube machinery—immediate shipment. Theo. Adams, 111 W. Washington St., Chicago, Ill. O-31

FOR SALE | **FOR SALE** | **FOR SALE**

TARENTUM PRODUCTS CORP.

TARENTUM, PENNSYLVANIA

1—Majestic Jordan SA-255, complete with new oiling, 5/16" tanks, No. 6 Fast Jordan Coupling, and following drive:

1 Westinghouse Induction Motor type CS 575 HP 2300 volts 3 phase 60 cycles 97 amps. 900 RPM Ser. #1468196 complete with one control panel, including one Westinghouse 900 amp. Oil Circuit Panel.

1 set Disconnect Switches.

1—Westinghouse DS Motor 75 HP 300 volts 265 amps. 575 RPM Frame 183 Ser. #2478580. Complete with starting control, circuit breaker and motor.

1—Elliott Water Pump, capacity 800 gallons per minute, serial #37876. Direct connected to one G.E. Motor 25 HP D.C. Type CD 88-250 91.3 amps 1750 RPM Ser. #1539886. Complete with one starting control and switch.

1—Westinghouse Generator 70 KW 250 volts DC 280 amp. 375 RPM Ser. #344451 with one Field Rheostat, one two-pole circuit breaker 600 amp., one Westinghouse 500 amp. ammeter and shunt. This Generator driven by Buckeye Steam Engine, 100 lbs. steam pressure engine #3156.

1—2000 KW A.C. Turbine Generator complete with all accessories.

1—Allis-Chalmers Induction motor 200 HP 870 RPM 2200 volts, 3 ph 60 cy 39 amp. Serial #2K13098.1.

1—G.E. Induction Motor type KT 306-6-25-1200 Form B 3 ph 60 cy 220 volts 36 HP 91 amp. 1200 RPM Ser. #1663984 complete with one G.E. OIL Switch type F Form K20 60 amp 600 v Ser. #308400.

1—G.E. Starting Compensator CR1034 220 volts 3 ph 60 cy type RR 1022.

1—G.E. Induction Motor (slipring) Frame 15A 150 HP Form M 720 RPM 2200 v. 3 ph 60 cy 36 amp Ser. #1180132.

1—G.E. Induction Motor (slipring) Frame 15A 180 HP Form M 720 RPM 2200 v. 3 ph 60 cy 36 amp.

1—Westinghouse 30 HP D.C. Motor 220 volts 117 amp. 975 RPM Ser. #983501.

1—G.E. Motor DC Type MP Form H 20 HP 1025 RPM 230 volts 70 amp. Ser. #19880, complete with manual starting equipment.

1—100" Sheet Cutter complete with stands for 10 rolls, and layboy.

1—G.E. Motor DC Type RC80 Form A 15 HP 850 RPM 230 volts 53.5 amp. Ser. #957750, complete with variable speed control for armature and field.

1—G.E. Motor DC 7.5 HP 230 volts 36.2 amp 850 RPM Type RC-29A Form A29 Ser. #1148541.

1—G.E. Motor DC 10 HP 230 volts 575.1 amp 850 RPM Type RC 29 Form A29 Ser. #1148980.

1—Westinghouse DC Motor Type S 5 HP 220 volts 21 amp. 1300 RPM Ser. #112092.

1—G.E. Motor DC 85 HP 120 amp. 230 volts 700 RPM BLC 202 Form A Compound Ser. #434342, complete with starting control.

1—G.E. Induction Motor (slipring) Type IE 15AA-4-186-1888 FORM M 3 ph 60 cy 2200 volts 150 HP 34.5 amp 1745 RPM Ser. #2844576 complete with panel. One G.E. Switch Panel type ATI 89006, one Drum Controller and Resistance variable speed.

1—Master Electric Worthington Pump and Motor. Pump is good for 100 gal. per minute 5 HP Motor 220 volts DS 3420 RPM Ser. #DC-3495.

1—Robbins & Myers Hoist ½ HP 230 volts DC 400 RPM Ser. #71309KH.

1—Master Electric Gear Head Motor 1 HP 230 volts DC 1725 RPM Ser. CE863.

1—Shepard Liftabout Electric Hoist 2,000 lb. capacity 230 volts DC Serial #71569.

1—Wright Electric Hoist 1,000 lb. capacity 230 volts DC 1200 RPM Ser. #27068.

3—ILG Ventilating Fans ¼ HP 230 volts DC 855 RPM.

2—G.E. CP67 Compressor Head Air Pumps 230 volts DC Complete with pressure line switches.

1—Allis-Chalmers DC Motor 5 HP 220 volts 1050 RPM Ser. 44537.

1—Westinghouse DC Motor 10 HP 46 amp. 230 volts 1725 RPM Frame 56L Ser. #1458535.

1—Daniels Rag Cutter #2.

1—Horizontal Rotary Digester 7' dia., 22' long with gearing reduction.

1—Horizontal Rotary Digester 8' dia., 20' long with gearing reduction.

1—Bucket type conveyor elevator. Buckets size 5" x 17", approximately 48' long. Rise on incline approx. 15'. All steel construction with Rex Chain Drive, complete with one Foote Bros. gear reducer type 25W 48 to 1 ratio, ser. 180982, driven by one G.E. DC Motor type RC27A Form A-36 5 HP 19.1 amp 230 volts 1160 RPM.

1—R40 Reducer, 12 to 1 ratio.

1—Slipring motor 75/150 HP Type CW 3 ph 60 cy 2200 volts 230/580 RPM Ser. #3234695, complete with starting equipment.

1—Slat conveyor steel construction 4' wide, 3' high, 42' long, driven by one Jones Spur Gear Reducer, ratio 27 to 1, Ser. #10138. Driven by one Sprag Electric DC Motor type LG 10 HP 37.2 amps 230 V 100 RPM Ser. #BL 2008213, complete with sheaves and V Belt drive, one Westinghouse Automatic Starter.

1—John Waldron Embosser #711.

1—Thorpe Hydraulic Press complete with 4 steam platen plates 40" x 40", and one Equalizer Pump.

1—Five cylinder Holyoke Duster.

1—Two-color Kidder Rotary Press, with various plates and printing rolls.

3—Beaters, 1000 lb., cast iron tub, complete with roll.

2—Beaters, high speed, 2000 lb., cast iron tub, complete with roll.

1—Banded type Emerson Beater Roll, 54" face, 30" diameter, complete with stands.

MISC.

Platform Scales.
Paper Testing Equipment.
Two-wheeled hand trucks.
One Shartle Bros. Duplex Stock Pump 8 x 18.

TF

FOR SALE

One 60-ton capacity Shartle Brothers continuous breaker beater with perforated backfall, overall length of Tub 39'6", width of rolls 58", diameter 66", regular Shartle steel shaft and built-up roll, hollow mid-feather. Available for immediate shipment. Now in operation but will be shut down within a week. Address Box 46-712 care Paper Trade Journal. O-31

FOR SALE

Two practically new Ransome Machinery Company Special Agitators with 9 ft. diameter 11 ft. 6 in. long drums on steel frames without power but complete with gear reduction unit, including V-belts and pulleys, mixer equipped with special 8 in. pipe complete with trough arrangement. Address Box No. 46-761 in care of Paper Trade Journal. N-14

FOR SALE—Cellophane. Available in small cut size sheets, either moistureproof or plain. Fairly prompt delivery. Address Box 46-603 care Paper Trade Journal. TF

FOR SALE—1 Hamilton-Corliss Variable Speed Twin Engine, size of cylinders 12" x 24". Also Triple-Deck Frames for ninety 36" dryers, any width. The Chesapeake Paperboard Co., Baltimore 30, Md. TF

FOR SALE—1—54" Hamblet Sheeter with Maxim Layboy. Perfect condition. Available immediately. No brokers. Address Box 46-752 care Paper Trade Journal. O-31

FOR SALE—2 Quadruple Effect Vertical Body Evaporators for caustic liquors; 2—7½" dia. x 65' long Rotary Dryers. Priced right for quick sale. Write for detailed specifications. BRILL EQUIPMENT COMPANY, 225 West 34th Street, New York 1, N. Y. N-7

FOR SALE—One 38" two color Rotogravure Press. Sheet feed and pile delivery. Practically new. Address Box 46-541 care Paper Trade Journal. TF

OFFER—180 Copper Covered Steel Beater Bars, 6" wide x 60" long. These are new bars and were purchased for Umpherston beaters. Address Box 46-717 care Paper Trade Journal. O-31

FOR SALE—1—Economy 1,000# Capacity Electric Tiering Machine; 1—Economy 1,500# Capacity Electric Tiering Machine. Both equipped with: 3 h.p., 230 Volt, D-C Roth Motor. Address Box 46-726 care Paper Trade Journal. D-12

FOR SALE—1—32"—7-Print Waldron Coater. Perfect condition. Available immediately. No brokers. Address Box 46-751 care Paper Trade Journal. O-31

FOR SALE—Three wire stitching machines to attach handles to paper shopping bags. Address Box 46-756 care Paper Trade Journal. O-31

FOR SALE—Rebuilt Elwell Parker electric fork truck with brand new ready power motor unit. Address Box 46-759 care Paper Trade Journal. N-21

FOR SALE—ANILINE PRINTER—4 color Waldron, 46" wide, with Waldron-type hot-air dryer, ink pump system, 40 plate cylinders for ten different repeats, excellent for paper or cloth printing. Contact H. H. Heinrich, Inc., 200 Varick Street, New York, 14, N. Y. O-31

FOR SALE—One Perkins 25" width 3 roll glassine type supercalender, complete with motor and drive, Vickery Doctors rewind, and unwind shafts, etc. In perfect condition. Address Box 46-764 care Paper Trade Journal. N-7

FOR SALE—Laboratory Hot Melt Coating and Laminating Machine. Address Box 46-766 care Paper Trade Journal. N-21

FOR SALE—38" Oswego Automatic Clamp Cutter, fully rebuild and guaranteed. Address Box 46-768 care Paper Trade Journal. O-31

CLASSIFIED ADS BRING RESULTS

WANTED

WANTED

Dryers 48 x 154" or wider. One or two calender stacks 154" or wider.

Box No. 46-745 care Paper Trade Journal

O-31

WANTED

42" Automatic sheeter with Lay Boy. Prefer Beck Model but will consider other makes.

FACIL FABRICS CORP.

185 Sixth Avenue, Paterson, N. J.

O-31

WANTED—Roll Grinder for rolls up to 132" face and 30" diameter. Must be in good condition. Motors to be 3/60/440. Address Box 46-638 care Paper Trade Journal. N-7

WANTED TO BUY—Tissue Mill in running condition with or without pulp contract. Principals only. State location, price and full particulars. Address Box 46-715 care Paper Trade Journal. O-31

WANTED—W & P Shredders, Evaporators, Generators and Boilers, Slitters, Cutters, Hydraulic Presses, Sheridan Presses, Dryers. Address Box 46-32 care Paper Trade Journal. TF

WANTED

WANTED

Fourdrinier Machine
Trim over 100″
Responsible party.
All cash deal.

Address Box #46-723,
care Paper Trade Journal

N-7

WANTED

Side rolls odd lots of any kind of paper in rolls 12½″ and wider any color, preferably white, also printed with any design. All grades.

Contact

GEORGE S. BLEYER
BLEYCO PAPER CORP.
214 Sullivan St., New York #12

D-26

PAPER MANUFACTURER desires to purchase or invest in converting business of standard paper products. Address Box 46-708 care Paper Trade Journal. TF

WANTED — One Seybold Paper Cutter 50 inches or larger. Write Gale Paper Products Corp., 1546 Cortland, Chicago, Ill. O-31

WANTED

WANTED

Dryers—38″ face minimum x 36″ to 60″ diameter complete with bearings, gears and frames.

4 to 6—Dryers—85″ face x 36″ diameter complete with bearings, gears and frames.

2—Rubber worm felt rolls—85″ face. Journals $1\frac{1}{16}$″ dia. x 8″ long.

1—Supercalender stack—7 to 10 rolls—50″ face minimum.

Address Box 46-765
care Paper Trade Journal

N-21

BLANKETS

Converted From Your Used Felts

Write for Full Details

BLOOMFIELD WOOLEN COMPANY
BLOOMFIELD, IND.

WANTED—Paper Board Machine, capable of producing 35 to 100 tons folding box board daily. Replies held in strictest confidence. Address Box 46-651 care Paper Trade Journal. TF

WANTED

WANTED — DISCARDED PAPER MILL FELTS. HIGHEST PRICES paid for all kinds of discarded paper mill felts. LARGE or SMALL QUANTITIES accepted. Prices quoted immediately on receipt of samples. ADDRESS: GLASER AND YOFFE, INC., 80 NORTH MAIN ST., NATICK, MASS. TF

WANTED—Brightwood Box Machine. Address Box 46-33 care Paper Trade Journal. TF

WANTED—32″ to 40″ Waldron Reel, any condition. Address Box 46-739 care Paper Trade Journal. O-31

OPPORTUNITY

WILL SUPPLY PULP TO REPUTABLE MILL IN RETURN FOR MACHINE TIME. REPLY SPECIFYING TYPE OF MACHINE ALSO TRIM. ADDRESS BOX 46-755 CARE PAPER TRADE JOURNAL. O-31

SALES AGENCY

WELL ESTABLISHED FIRM in Shanghai, with years of experience in paper business desires to contact American Mills or exporters of paper, board or pulp; interested to be appointed agents in China. Write Paper Dept., P. O. Box 1172, Shanghai, China. N-14

MISCELLANEOUS

WILL EXCHANGE board for laminating, mounting, lining and die-cutting machinery. Address Box 46-707 care Paper Trade Journal. TF

MILL AND MILL EQUIPMENT NUMBER

of

PAPER TRADE JOURNAL

will be

December 5, 1946

SHORT OF PULP?

Here is a profitable solution for you!

If your machines are idle part of the time, for lack of pulp, here is the answer which will solve this critical problem:
We use very large quantities of remade kraft and bogus, basis 24 x 36 75-80 pounds. We can supply you with unlimited supplies of waste . . . to keep your machines operating full time . . . and we will purchase the finished product in your maximum machine trim.
Please write us about your needs . . . available machine time and trim.
Converter located in the East. Box 46-754 care Paper Trade Journal. N-7

MISCO "C"
THE CORROSION RESISTANT ALLOY
CAST • ROLLED • FABRICATED
for all equipment exposed to corrosion by sulphite acids
MICHIGAN STEEL CASTING CO., DETROIT 7, MICH.

HIGHLY RATED PAPER CONVERTER SEEKING STEADY SOURCE FOR DRY WAX SULPHITE AND WAXED BLEACHED KRAFT.
If you are a producer of either of these grades and are willing to gamble a little tonnage over the critical period against the time when an order for a few cars a month would really be something to bring into your office, I'm sure it would be to our mutual advantage to get together and talk this over. We can be relied upon to be the type of account which would give you nice tonnage month in and month out throughout the year.
Address Box 46-719 care Paper Trade Journal. N-7

Appleton Felts
MAKE GOOD PAPER
APPLETON WOOLEN MILLS
APPLETON, WISCONSIN

"GIANT" RAG CUTTERS
for both Large and Small PAPER MILLS.
Capacities from one to five tons an hour.
10 Bridge Street, Riegelsville, N. J.
TAYLOR-STILES and Company
CUTTING MACHINES & KNIVES

Volclay MOST COLLOIDAL BENTONITE
For the Paper Manufacturer
Produced By
AMERICAN COLLOID COMPANY
363 W. Superior St. — Chicago, Ill.

INTERNATIONAL WIRE WORKS
Fourdrinier Wires
MENASHA, WISCONSIN

Appleton Wires are Good wires
APPLETON WIRE WORKS, INC. APPLETON, WIS.

PULP MILL MACH'Y FINISHING ROOM MACH'Y
FRICTION CLUTCHES
The MOORE & WHITE Co.
PHILADELPHIA, PA.
N. PHILA. STA. PENNA. R.R.
PAPER MILL MACHINERY

THE MAYER MACHINE COMPANY, INC.
Manufacturers of
Paper Coating Machines
1155 Scottsville Road, Rochester 11, N. Y.
Waxing & Oiling, Carbon, Laboratory, Flat Beam Converting and Measuring and Roadmarking.

K-121-B DEINKING — DECOLORIZING and COOKING PROCESSES K-C-2
THE KINSLEY CHEMICAL COMPANY
12500 Berea Road Cleveland, Ohio

STEAM TURBINES
HELICAL GEARS
WORM GEARS
CENTRIFUGAL BLOWERS AND COMPRESSORS
CENTRIFUGAL PUMPS
PROPELLER PUMPS
CLOGLESS PUMPS
MIXED-FLOW PUMPS
DE LAVAL-IMO OIL PUMPS
DE LAVAL STEAM TURBINE CO.
TRENTON 2, NEW JERSEY

INDUSTRIAL TYCOL OILS-GREASES
A COMPLETE LINE
OF TYCOL LUBRICANTS SCIENTIFICALLY ENGINEERED FOR EVERY INDUSTRIAL USE
Tide Water Associated Oil Co.
Eastern Division
17 Battery Place, New York, N.Y.

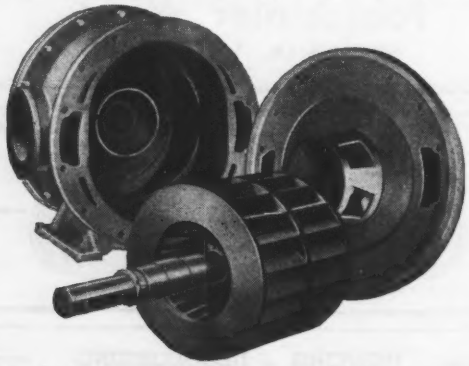
A MACHINE
for
EVERY TYPE
PAPER BAG

POTDEVIN

PAPER BAG MACHINES

POTDEVIN MACHINE CO.
EST. 1893
1223 38TH ST BROOKLYN, N.Y.
POTDEVIN

SIMPLICITY



NASH VACUUM PUMPS HAVE ONE MOVING PART

Operating advantages made possible by the Nash principle, and present in no other type of vacuum pump, permit a new level of operating economy. Nash Vacuum Pumps have but one moving part, a rotor cast in one piece, and revolving without metallic contact. There are no valves, no pistons or sliding vanes, no internal parts requiring wear adjustment or lubrication.

NASH ENGINEERING COMPANY
SOUTH NORWALK, CONNECTICUT, U. S. A.

WHERE TO BUY

ABRASIVES
Monsanto Chemical Co.
Norton Co.
Raybestos-Manhattan Inc. Manhattan Rubber Division

ADHESIVES
American Anode Incorporated
American Resinous Chemicals Corp.
Arabol Mfg. Co.
Casein Company of America
Flintkote Company
Kelco Company
Monsanto Chemical Co.
National Adhesives Division of National Starch Products, Inc.
Philadelphia Quartz Co.
Stein, Hall & Co., Inc.
United States Rubber Co.

AGITATORS
Appleton Machine Co.
Biggs Boiler Works Co.
Dilts Machine Works, Inc.
Dorr Company
Downingtown Mfg. Co.
Hardinge Co., Inc.
Improved Paper Machy. Corp.
E. D. Jones & Sons Co.
D. J. Murray Mfg. Co.
Montague Machine Co.
Moore & White Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Valley Iron Works Co.

AIR CONDITIONING
Spray Engrg. Company
Steamaire Company

ATOMIZERS
Steamaire Company

BAG MACHINES
Potdevin Machine Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Weber, Herman G.

BALING MACHINES
Thomas W. Hall Co.

BARKERS AND CHIPPERS
Allis-Chalmers Mfg. Co.
Appleton Machine Co.
Carthage Machine Co.
Fibre Making Processes, Inc.
D. J. Murray Mfg. Co.
Valley Iron Works Co.

BARS
Dilts Machine Works, Inc.
E. D. Jones & Sons Co.
The Moore & White Co.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Valley Iron Works Co.

BEARINGS
Black-Clawson Company
Jones, E. D., & Sons Co.
Magnus Metal Corp.
Montague Machine Works
Raybestos-Manhattan Inc. Manhattan Rubber Division
Rollway Bearing Co.
Shartle Brothers Machine Co.
SKF Industries, Inc.
Timken Roller Bearing Co.
Valley Iron Works Co.
T. B. Woods' Sons Company

BEATERS & JORDANS
The Appleton Machine Co.
Black-Clawson Company
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
Hermann Mfg. Co.
E. D. Jones & Sons Co.
Noble & Wood Machine Co.
J. J. Ross Company
Ross Paper Machy. Co.
Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works

BED PLATES
Bahr Brothers Mfg. Co.
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
Farrel-Birmingham Co., Inc.
E. D. Jones & Sons Co.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Valley Iron Works Co.

BELTING
Alexander Brothers
Allis-Chalmers Mfg. Co.
The Cincinnati Rubber Mfg. Co.
Raybestos-Manhattan Inc. Manhattan Rubber Division
J. E. Rhoads & Sons
United States Rubber Co.
T. B. Wood's Sons Company
Worthington Pump & Machy. Corp.

BLEACHING BOILERS, ROTARY
The Biggs Boiler Wks. Co.

BLEACHING APPARATUS
The Biggs Boiler Works Co.
Improved Paper Machy. Corp.
E. D. Jones & Sons Co.
Perkins & Sons, Inc., B. F.
Moore & White Co.
Niagara Alkali Co.
Noble & Wood Machine Co.
Pennsylvania Salt Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.

BLOW PIPES & PITS
Carthage Machine Co.
Montague Machine Co.
Moore & White Co.
Murray Mfg. Co., D. J.
Walworth Company

BOILERS
Babcock & Wilcox Co.
Biggs Boiler Works
Foster Wheeler Corp.

BOILERS (Electric)
Steamaire Company

BOTTOMS
Harrington & King Perforating Co.
Kalamazoo Tank & Silo Co.
Valley Iron Works Co.

CALENDERS
Black-Clawson Company
Downingtown Mfg. Co.
Farrel-Birmingham Co., Inc.
Lobdell Car Wheel Co.
Moore & White Co.
Perkins & Son, Inc., B. F.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works
Waldron Corp., John

CASEIN
Casein Company of America

CASTINGS
Appleton Machine Co.
Black-Clawson Company
Carthage Machine Co.
Dilts Machine Works
Downingtown Mfg. Co.
Farrel-Birmingham Co.
Grinnell Company
Hamblet Machine Co.
Hardinge Co., Inc.
E. D. Jones & Sons Co.
Lobdell Car Wheel Co.
Magnus Metal Corp.
Montague Machine Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Union Machine Company
Union Screen Plate Co.
Valley Iron Works Co.

WHERE TO BUY

Walworth Company

CENTRIFUGAL MACHINERY
Bird Machine Co.
De Laval Steam Turbine Co.
Nichols Engrg. & Research Corp.
Ross, J. O., Eng. Co.
Shartle Brothers Machine Co.
Williams Apparatus Co.

CHEMICALS
American Anode, Incorporated
Amer. Cyanamid & Chem. Corp.
Amer. Resinous Chemicals Corp.
Ansul Chemical Co.
Calco Chemical Co.
The Cowles Detergent Co.
Diamond Alkali Co.
Dispersion Process, Inc.
Dow Chemical Company
E. I. du Pont de Nemours & Co., Inc.
Falls Chemical Products Co.
General Dyestuff Corp.
Geigy Co., Inc.
Gottesman & Co.
Hooker Electrochemical Company
Keico Company
Mallinckrodt Chemical Wks.
The Mathieson Alkali Works, Inc.
Monsanto Chemical Company
National Oil Products Co.
Naugatuck Chemical Div. of U. S. Rubber Co.
Niagara Alkali Company
Paper Makers Chemical Department, Hercules Powder Co.
Pennsylvania Salt Mfg. Co.
Philadelphia Quartz Co.
Pioneer Salt Company
Pittsburgh Plate Glass Co., Columbia Chemical Division
Solvay Sales Corp.
United States Rubber Co.
Witco Chemical Co.
Wyandotte Chemicals Corp.

CLEANING MATERIALS
Adell Chemical Company
Amer. Cyanamid & Chem. Corp.
Bird Machine Co.
The Cowles Detergent Co.
E. I. du Pont de Nemours & Co., Inc.
Paper Makers Chemical Department, Hercules Powder Co.
Magnus Chemical Co.
Monsanto Chemical Co.
Nichols Engrg. & Research Corp.
Oakite Products, Inc.
Pennsylvania Salt Mfg. Co.
Philadelphia Quartz Co.
Pittsburgh Plate Glass Co., Columbia Chemical Division
Solvay Sales Corp.
Wyandotte Chemicals Corp., J. B. Ford Division

CLUTCHES
Appleton Machine Co.
Black-Clawson Company
Hudson Sharp Machine Company
Farrel-Birmingham Co.
Fawick Airflex Co., Inc.
Hardinge Co., Inc.
Rodney Hunt Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
The Sandy Hill Iron & Brass Wks.
Stearns Magnetic Mfg. Co.
T. B. Wood's Sons Company

COATING MACHINERY
Hudson Sharp Machine Company
Mayer Machine Co.
Moore & White Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co.
South Wabash Engrg. Co.
Waldron Corporation, John
Weber, Herman G.

COCKS, LUBRICATED PLUGS
American Car & Foundry Co.

COMPRESSORS
Allis-Chalmers Mfg. Co.
De Laval Steam Turbine Co.
Ingersoll-Rand Co.
Nash Engineering Co.
Worthington Pump & Machy. Corp.

CONDENSERS
Foster Wheeler Corp.

CONSULTING ENGINEERS
Frederic C. Clark
Ferguson, Hardy S.
Hardy, George F.
Alvin H. Johnson & Co., Inc.
The Kohler System Company
Main, Inc., Chas. T.
The McPherson Company
Roderick O'Donaghue
The Rust Engrg. Co.
J. E. Sirrine & Co.
South Wabash Engrg. Co.
Stone & Webster Engrg. Corp.

CONTROLLERS
Black-Clawson Co.
Cochrane Corp.

CONTROLS
The Bristol Company
Cochrane Corp.
Stickle Steam Specialties Co.

CONVEYORS
Black-Clawson Company
Murray, D. J., Mfg. Co.
Ross Engineering Corp., J. O.

COOLING SYSTEMS
Foster Wheeler Corp.
Steamaire Company

CORES
Elixman Paper Co.
Rodney Hunt Machine Co.
Montague Machine Co.
Smith & Winchester Mfg. Co.
Sonoco Products Co.
Walker-Goulard-Plehn Co.

COUPLINGS
Black-Clawson Company
De Laval Steam Turbine Co.
Farrel-Birmingham Co., Inc.
Hardinge Co., Inc.
E. D. Jones & Sons Co.
Lovejoy Flexible Coupling Co.
Moore & White Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Valley Iron Works
Waldron Corp., John
Westinghouse Electric Corporation
T. B. Wood's Sons Company

CRANES
Northwest Engrg. Co.
Reading Chain & Block Company

CRUSHERS
Fibre Making Processes, Inc.

CUTTERS
Dilts Machine Works
Thomas W. Hall Co.
Noble & Wood Machine Co.
Perkins & Son, Inc., B. F.
The Smith & Winchester Mfg. Co.
South Wabash Engrg. Co.
Taylor Stiles & Co.

DAMPENERS
Perkins & Son, Inc., B. F.
Steamaire Company
Valley Iron Works Co.

DE-INKING
Adell Chemical Company
Dilts Machine Works
Hardinge Co., Inc.
Kinsley Chemical Co.
Shartle Bros. Mach. Co.

DIGESTERS
Biggs Boiler Works Co.
Foster Wheeler Corp.
Pusey & Jones Corp.

DOCTORS
Bird Machine Company

LET LITHCOTE (COATING & LINING)

★BEAT CORROSION

★CUT DE-SLIMING COSTS

in YOUR plant

Lithcote is the new, long-lasting, acid-resistant coating that's putting an end to many paper mill corrosion problems. Plant records show substantial economies on Lithcote-treated pipe-lines and equipment. In de-sliming savings alone, Lithcote puts these plants way ahead in terms of time and dollars.

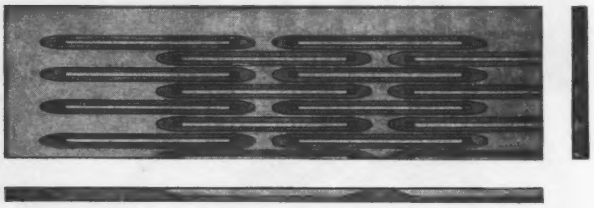
Smooth, baked-on, glass-like Lithcote (a phenol formaldehyde synthetic resin) is a lasting defense against slime accumulation in white-water and stock lines. Applied to Fourdrinier parts, Lithcote effectively eliminates corrosion around the wet-end of the machine. Existing lines, parts, and tanks reclaimed and conserved with Lithcote, last indefinitely.

Lithcote protection can reduce shutdowns throughout your mill in:
WHITE WATER LINES • STOCK LINES • PIPE FITTINGS • SCREEN BODIES • SCREEN COVER PLATES • DECKER BODIES • SPIDER SEGMENTS • FILTER BODIES • C. I. END PLATES • SAVEALL BODIES • STOCK CHESTS • AGITATORS • PROPELLERS • SHAFTS • STUFFING BOXES • WALL FRAMES • PUMPS • IMPELLERS.

Write to Bedford Development Corporation for factual details and case histories. Lithcote may be applied in our plant or we will send a trained crew to your plant for coating or lining equipment too large for shipping to us.

BEDFORD DEVELOPMENT CORP.
230 PARK AVENUE • NEW YORK 17, N. Y.
Sales Representatives for
LITHGOW CORPORATION • CHICAGO

Efficient Screening



plus long service

Many paper and pulp mills prefer Hendrick Milled Slot Screens because they provide efficient screening, with slots of requisite fineness, plus the necessary strength to withstand heavy loading.

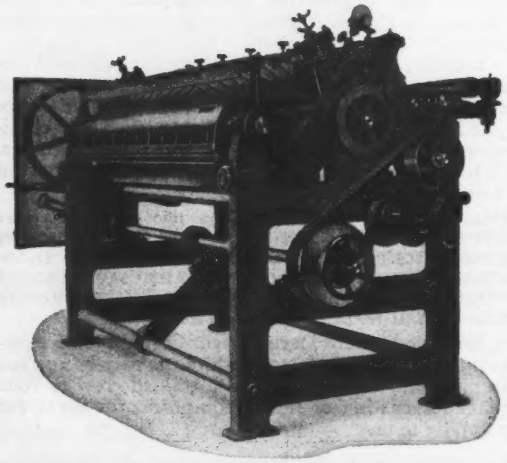
Hendrick Milled Slot Screens are furnished in bronze, copper, Monel, stainless steel, and other commercially rolled metals. Write for details on sizes of slots and openings, and gauges of metal.

Perforated Metals
Perforated Metal Screens
Architectural Grilles
Mitco Open Steel Flooring,
"Shur-Site" Treads and
Armorgrids.

HENDRICK
Manufacturing Company
50 DUNDAFF STREET, CARBONDALE, PA.
Sales Offices in Principal Cities

MODEL 28

ROLLER BEARING CUTTER



HAMBLET MACHINE CO.

LAWRENCE, MASS.

MAKERS OF
SINGLE, DUPLEX AND DIAGONAL PAPER CUTTERS
CUTTER KNIVES, PATENT TOP SLITTERS

WHERE TO BUY

Black-Clawson Company
Downingtown Mfg. Co.
Lobdell Co.
Lodding Engineering Corp.
Montague Machine Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.

DOCTOR BLADES
Black-Clawson Company
Lodding Engrg. Corp.
Montague Machine Co.
Raybestos-Manhattan Inc.
Manhattan Rubber Division
Rotogravure Engrg. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers
United States Rubber Co.
Westinghouse Electric Corporation

DRIERS
Black-Clawson Company
Murray Mfg. Co., D. J.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Valley Iron Works Co.

DRIVES
Allis-Chalmers Mfg. Co.
Appleton Machine Co.
Bird Machine Co.
Black-Clawson Company
Davis, Frank H., Co.
De Laval Steam Turbine Co.
Dilts Machine Works
Downingtown Mfg. Co.
Farrel-Birmingham Co.
General Electric Company
Rodney Hunt Machine Co.
Montague Machine Co.
Moore & White Co.
Murray, D. J., Mfg. Co.
Noble & Wood Machine Co.
Pusey & Jones Corp.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
T. B. Wood's Sons Co.
Valley Iron Works Co.
Westinghouse Electric Corporation

DRUMS
Fibre Making Processes, Inc.

DRYER DRAINAGE
Stickle Steam Specialties Co.

DUSTERS
Appleton Machine Co.
Downingtown Mfg. Co.
Fibre Making Processes, Inc.
E. D. Jones & Son Co.
Moore & White Co.
Noble & Wood Machine Co.
Norwood Engrg. Co.
D. J. Murray Mfg. Co.

DYESTUFFS
Calco Chemical Co.
Ciba Company
E. I. du Pont de Nemours & Co., Inc.
Geigy Co., The
General Dyestuff Corp.
National Aniline Division, Allied Chemical & Dye Corp.
Paper Makers Chemical Department, Hercules Powder Co.
C. K. Williams & Co.
Witco Chemical Co.

EMBOSSING ROLLS
Northern Engraving & Mch. Co.
Roehlen Engraving Works

EVAPORATORS
Black-Clawson Company
Foster Wheeler Corp.
Goslin-Birmingham Mfg. Co., Inc.
Murray, D. J., Mfg. Co.
Swenson Evaporator Co., Div. of Whiting Corp.

FANS
General Electric Co.
B. F. Perkins & Son, Inc.
Ross Engineering Co., J. O.

FEEDERS
Fibre Making Processes, Inc.
Hardinge Co., Inc.
Merrick Scale Mfg. Co.
Leeds & Northrup
Wallace & Tiernan

FELTS
Appleton Woolen Mills
Asten-Hill Mfg. Co.
Bloomfield Woolen Co.
Bulkley, Dunton Pulp Co., Inc.
Draper Bros. Corp.
Huyck & Son, F. C.
Lockport Felt Co.
Mt. Vernon-Woodbury Mills, Inc.
Morey Paper Mill Supply Co.
Orr Felt & Blanket Co.
Shuler & Benninghofen
Waterbury Felt Co.
Waterbury, H., & Sons Co.

FELT CONDITIONERS
Steamaire Company

FELT GUIDES
Moore & White Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Waldron Corp., John

FILLERS
Aluminum Flake Co.
American Colloid Co.
Amer. Cyanamid & Chem. Corp.
Amer. Resinous Chemicals Corp.
Johns-Manville Sales Corp.
W. H. Loomis Talc Corp.
Vanderbilt Co., R. T.
Witco Chemical Co.

FILTERS
Cochrane Corp.
Hardinge Co., Inc.
Moore & White Co.
J. O. Ross Engrg. Corp.
Witco Chemical Co.
Worthington Pump & Machy. Corp.

FLOORING, GRATING & TREADS
Hendrick Mfg. Co.
Klemp Co., W. F.
Norton Co.
Raybestos-Manhattan Inc.
Manhattan Rubber Division
United States Rubber Co.

FORMING MACHINES
Downingtown Mfg. Co.
Noble & Wood Machine Co.
Oliver United Filters
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
South Wabash Engrg. Co.

FRICTION MATERIALS
Johns-Manville Sales Corp.

FREENESS TESTERS
Testing Machines, Inc.
Williams Apparatus Co.

GEARS
Black-Clawson Company
De Laval Steam Turbine Co.
Downingtown Mfg. Co.
Farrel-Birmingham Co.
E. D. Jones & Sons Co.
Moore & White Co.
D. J. Murray Mfg. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
Waldron Corp., John

GRINDERS
Carthage Machine Co.
Farrel-Birmingham Co.
Lobdell Car Wheel Co.
Montague Machine Co.
Norton Company
Samuel C. Rogers and Company
The Sandy Hill Iron & Brass Wks.

GRINDING WHEELS
The Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc.
Norton Company
United States Rubber Co.

HEAT EXCHANGERS
Foster Wheeler Corp.
Stickle Steam Specialties Co.

HEAT RECOVERY SYSTEMS
Foster Wheeler Corp.
Stickle Steam Specialties Co.

HEATING, VENTILATING AND AIR CONDITIONING
The Appleton Machine Co.
Armstrong Machine Works
Cochrane Corp.
E. D. Jones & Sons Co.
General Electric Co.
Grinnell Company
Leeds & Northrup
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
Ross Engineering Corp., J. O.
Shartle Brothers Machine Co.
Stickle Steam Specialties Co.
Valley Iron Works Co.
Worthington Pump & Machy. Corp.

HOISTS
Appleton Machine Co.
Dilts Machine Works
Rodney Hunt Machine Co.
Ingersoll-Rand Co.
E. D. Jones & Sons Co.
Reading Chain & Block Corp.

HOSE (Air, Water, Suction, etc.)
The Cincinnati Rubber Mfg. Co.
Raybestos-Manhattan Inc.
Manhattan Rubber Division
United States Rubber Co.

WHERE TO BUY

HUMIDITY CONTROL
Spray Engrg. Company
Steamaire Company
HYDRAPULPERS
Ross Paper Machy. Co.
INSTRUMENTS, TESTING AND MEASURING
Bauer Brothers Co.
N. P. Bewsher
The Bristol Company
Cochrane Corp.
The Foxboro Company
General Electric Company
W. & L. B. Gurley
Leeds & Northrup Company
National Technical Laboratories
B. F. Perkins & Son
Tabor Instrument Corp.
Taylor Instrument Cos.
Testing Machines, Inc.
Wallace & Tiernan Instrument Co.
Williams Apparatus Co.
INSULATION
Johns-Manville Sales Corp.
JOINTS
Parfosting Service Company
JORDAN FILLINGS
Appleton Machine Co.
Baur Brothers Mfg. Co.
E. D. Jones & Sons Co.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
KNIVES
Black-Clawson Company
Bliss Machine Works, Inc.
Hamblet Machine Co.
E. D. Jones & Sons Co.
Paley Iron Works Co.
KNOTTERS
Fibre Making Processes, Inc.
LABORATORY EQUIPMENT
Appleton Machine Co.
Bauer Brothers Co.
The Biggs Boiler Works Co.
W. H. & L. D. Betz
Bliss Machine Works
E. D. Jones & Sons Co.
Leeds & Northrup Company
National Technical Laboratories
Noble & Wood Machine Co.
Tabor Instrument Co.
Taylor Instrument Companies
Testing Machines, Inc.
Valley Iron Works
Williams Apparatus Co.
LAY BOYS
Hamblet Machine Co.
Moore & White Co.
Shartle Brothers
LINTER COTTON
The Railway Supply & Mfg. Co.
LUBRICANTS
Gulf Oil Corporation
Gulf Refining Co.
Sinclair Refining Co.
Socony-Vacuum Oil Co., Inc.
Sun Oil Company
The Texas Company
Tide Water Associated Oil Co.
LUBRICATORS
Hills-McCanna Co.
MATERIAL HANDLING
Automatic Transportation Co.
Brooks Equipt. & Mfg. Co.
Northwest Engrg. Co.
Reading Chain & Block Company
MICROMETERS & CALIPERS
Farrel-Birmingham Co.
Montague Machine Co.
Lobdell Car Wheel Co.
Testing Machines, Inc.
Walker-Goulard-Plohn Co.
MOISTENING EQUIPMENT
The Spray Engineering Co.
Steamaire Company
MOISTURE CONTENT CONTROL
Spray Engrg. Company
Steamaire Company
Stickle Steam Specialties Co.
Williams Apparatus Co.
MOTORS AND GENERATORS
Allis-Chalmers Mfg. Co.
Continental Electric Co.
De Laval Steam Turbine Co.
General Electric Co.
Ingersoll-Rand Co.
Reliance Electric & Engrg. Co.
Westinghouse Electric Corporation
NOZZLES
Spray Engrg. Company
Steamaire Company
PACKING BOXES
Johnson Corporation
Shartle Brothers Machine Co.
PACKING
Johns-Manville Sales Corp.
The Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc.
United States Rubber Co.

PAPER MACHINES
Bagley & Sewall Co.
Black-Clawson Company
Downingtown Mfg. Co.
Thomas W. Hall Co.
Moore & White Co.
Pusey & Jones
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
PAPER MACHINE SLICES
Black-Clawson Company
E. D. Jones & Sons Co.
Montague Machine Co.
The Sandy Hill Iron & Brass Wks.
Valley Iron Works Co.
PAPER MILL BUILDERS
Merritt-Chapman & Scott Corp.
The Rust Engrg. Co.
PAPER TUBE MACHINERY
Theo. Adams
Dietz Machine Works
Thomas W. Hall Co.
Hudson Sharp Machine Company
Langston Co., Samuel M.
South Wabash Engrg. Co.
PASTING MACHINES
Black-Clawson Company
Davis, Frank H., Co.
Murray, D. J., Mfg. Co.
Moore & White Co.
Potdevin Machine Co.
Shartle Brothers Machine Co.
South Wabash Engrg. Co.
Waldron Corp., John
PENSTOCKS, WELDED STEEL
The Biggs Boiler Works Co.
PERFORATED METAL
Allis-Chalmers Mfg. Co.
Harrington & King Perforating Co.
Hendrick Mfg. Co.
PIPE
Black-Clawson Company
Crane Company
Deublin Company
Grinnell Company
Johns-Manville Sales Corp.
Shartle Brothers Machine Co.
Stowe-Woodward, Inc.
Taylor Forge & Pipe Works
Walworth Company
PLATERS
Perkins & Son, Inc., B. F.
PLATES
Black-Clawson Company
Hendrick Mfg. Co.
J. O. Ross Engrg. Corp.
Shartle Brothers Machine Co.
Timken Roller Bearing Co.
PLATE WORK (Steel & Alloy)
The Biggs Boiler Works Co.
PLUGS
Black-Clawson Company
E. D. Jones & Sons Co.
The Noble & Wood Machine Co.
Shartle Brothers Machine Co.
PRESSURE VESSELS, STEEL AND ALLOY
The Biggs Boiler Works Co.
Foster Wheeler Corp.
PRESSES
Black-Clawson Company
Dietz Machine Works
Farrel-Birmingham Co.
Fibre Making Processes, Inc.
Thomas W. Hall Co.
Hudson-Sharp Machine Co.
Paper Converting Machine Co., Inc.
Potdevin Machine Co.
Rotogravure Engineering Co.
Shartle Brothers
South Wabash Engrg. Co.
Valley Iron Works Co.
Waldron Corp., John
Weber, Herman G.
Williams Apparatus Co.
PULPERS
Bauer Brothers Co.
PULPS
Andersen Co., J.
Bulkley, Dunton Pulp Co., Inc.
Gottesman & Co., Inc.
Elof Hansson, Inc.
Lyddon & Co. (America) Inc.
Parsons & Whittemore, Inc.
Perkins-Goodwin Co.
Price & Pierce, Ltd.
Pulp and Paper Trading Co.
PULPSTONES
Norton Company
PUMPS
Allis-Chalmers Mfg. Co.
Black-Clawson Company
Buffalo Pumps, Inc.
Dorr Company

Light-Fast COLORS ... for PAPER

Mapico Colors are permanent ... highly resistant to light, acids and alkalies. This characteristic together with their fine particle size, good fiber adhesion and chemical and physical stability has made Mapico Colors widely popular as colorants for a great variety of papers, cover stocks and board.

Look to MAPICO *for Leadership*

- DEPENDABILITY
- HIGH TINTING STRENGTH
- ECONOMY

If you wish technical cooperation our laboratory staff always is available.

MAPICO Colors
PURE OXIDES OF IRON
COLUMBIAN COLLOIDS

COLUMBIAN CARBON COMPANY
MAGNETIC PIGMENT DIVISION
MANUFACTURER
BINNEY & SMITH CO., *Distributor*
41 East 42nd St. • New York 17, N.Y.

YELLOWS • REDS • BROWNS • BLACK

West Virginia Pulp and Paper Company

230 Park Ave.
New York

35 East Wacker Drive
Chicago

Public Ledger Building
Philadelphia, Pa.

503 Market St.
San Francisco, Cal.

Manufacturers of

ENGLISH FINISH BOOK
SUPERCALENDERED BOOK
and LITHOGRAPHIC PAPERS

Offset, Envelope, Bond, Writing, Mimeograph, Ledger, Eggshell, Cover and Music Papers, Index Bristol, Post Card and Label Papers, Machine Coated

HIGH GRADE COATED BOOK

• • • •

KRAFT WRAPPING AND KRAFT ENVELOPE
KRAFT LINER BOARD
BLEACHED SULPHITE AND SODA PULP
BLEACHED AND UNBLEACHED KRAFT PULP

MILLS:

Mechanicsville, New York
Luke, Maryland
Covington, Virginia
Tyrone, Pennsylvania
Williamsburg, Pennsylvania
Charleston, South Carolina

High-Speed

PAPER BAG MACHINERY

MANUFACTURED BY

WEBER

H. G. WEBER & COMPANY, INC.

KIEL, WISCONSIN

WHERE TO BUY

Downingtown Mfg. Co.
De Laval Steam Turbine Co.
Hardinge Co., Inc.
Hills-McCanna Co.
Ingersoll-Rand Co.
Johnson Corp.
Moore & White Co.
Morris Machine Works
Nash Engineering Co.
Noble & Wood Machine Co.
Paper Converting Mch. Co.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Steamaire Company
Warren Steam Pump Company
Worthington Pump & Mchy. Corp.

RAG CUTTERS
B. F. Perkins & Son, Inc.
Taylor-Stiles & Co.

RECOVERY SYSTEMS
Bulkley, Dunton Pulp Co., Inc.
Rodney Hunt Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Pusey & Jones
Ross Engineering Corp., J. O.
Valley Iron Works Co.

REELS
Black-Clawson Company
Downingtown Mfg. Co.
De Laval Steam Turbine Co.
Hudson Sharp Machine Company
The Kohler System Company
Montague Machine Co.
Moore & White Co.
Paper Converting Mch. Co.
Rodney Hunt Machine Co.
Rotogravure Engrg. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
The Smith & Winchester Mfg. Co.

REFINERS
Appleton Machine Co.
Bahr Brothers Mfg. Co.
Bauer Brothers Co.
Dilts Machine Works
The Hermann Manufacturing Co.
E. D. Jones & Sons Co.
Murray, D. J., Mfg. Co.
Noble & Wood Machine Co.
Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Sprout, Waldron & Co.
Sutherland Refiner Corp.
Valley Iron Works

REGULATORS
Allis-Chalmers Mfg. Co.
Armstrong Machine Works
Bird Machine Company
The Bristol Company
The Brown Instrument Co.
Cochrane Corp.
The Foxboro Company
Jones, E. D., & Sons Co.
General Electric Co.
Johnson Corp.
Leeds & Northrup Company
National Technical Laboratories
Noble & Wood Machine Co.
Shartle Brothers
Stickle Steam Specialties Co.
Taylor Instrument Companies
Wallace & Tiernan
Westinghouse Electric Corporation

RESINS
Amer. Cyanamid & Chemical Corp.
Amer. Resinous Chemicals Corp.
Monsanto Chemical Co.
The Resinous Prod. & Chem. Co.

ROLLS
Appleton Machine Co.
Black-Clawson Company
Downingtown Mfg. Co.
Farrel-Birmingham Co.
Improved Paper Machy. Corp.
Lobdell Co.
Montague Machine Co.
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
Perkins, B. F., & Sons Co.
Philbrick Engrg. & Machine Co.
Pusey & Jones Corp.
Raybestos-Manhattan Inc.
Manhattan Rubber Division
Roehlen Engraving Works
J. J. Ross Company
Ross Paper Machy. Co.
Rodney Hunt Machine Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Sinclair Co.
Smith & Winchester Mfg. Co.
Stearns Magnetic Mfg. Co.
Stowe-Woodward, Inc.
United States Rubber Co.
Valley Iron Works Co.
Waldron Corp., John

ROLL COVERS
The Cincinnati Rubber Mfg. Co.
Stowe-Woodward, Inc.

ROLL STANDS
Cameron Machine Co.
The Kohler System Company
Moore & White Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co.
South Wabash Engrg. Co.

ROOFING MATERIALS
Johns-Manville Sales Corp.

ROTARY BOILERS
Biggs Boiler Works

SATURATING MACHINES
Black-Clawson Company
Moore & White Co.
Noble & Wood Machine Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co.
Waldron Corp., John
Weber, Herman G.

SAVEALLS
Bulkley, Dunton Pulp Co., Inc.

SCALES
Merrick Scale Mfg. Co.

SCREEN PLATES
Fitchburg Screen Plate Co.
Magnus Metal Corp.
Morey Paper Mill Supply Co.
Testing Machines, Inc.
Union Machine Co.
Union Screen Plate Co.

SCREENS
Allis-Chalmers Mfg. Co.
Appleton Wire Works
Appleton Machine Company
Bird Machine Company
Carthage Machine Co.
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
Harrington & King Perforating Co.
Hendrick Manufacturing Co.
E. D. Jones & Sons Co.
Montague Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Valley Iron Works Co.

SHEET MACHINES
Thomas W. Hall Co.
The Hermann Manufacturing Co.
Noble & Wood Machine Co.
Rotogravure Engrg. Co.
Valley Iron Works Co.
Williams Apparatus Co.

SHOWER PIPES
Bird Machine Company
A. E. Broughton & Co.
Downingtown Mfg. Co.
Improved Paper Machy. Corp.
Moore & White Co.
Shartle Bros. Mach. Co.
Smith & Winchester Mfg. Co.

SHREDDERS
Bauer Brothers Co.
Carthage Machine Co.

SIZING
Amer. Cyanamid & Chemical Co.
Amer. Resinous Chemicals Corp.
Black-Clawson Company
The Dow Chemical Company
du Pont, E. I., de Nemours & Co.
Flintkote Company
Kelco Company
Monsanto Chemical Co.
National Oil Products Co.
Paper Makers Chemical Department, Hercules Powder Co.
Philadelphia Quartz Co.
Pioneer Salt Company
Socony-Vacuum Co.
Stein, Hall & Co., Inc.

SLIME CONTROL
Falls Chemical Products Co.
Magnus Chemical Co.
Mallinckrodt Chemical Wks.

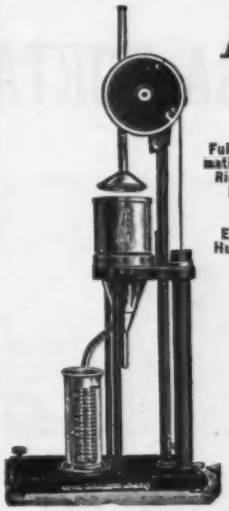
SLITTERS
Theo. Adams
Black-Clawson Company
Cameron Machine Co.
Carthage Machine Co.
Dietz Machine Works
Downingtown Mfg. Co.
Thomas W. Hall Co., Inc.
Hamblet Machine Co.
Hudson Sharp Machine Company
Langston Co., Samuel M.
Moore & White Co.
D. J. Murray Mfg. Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Smith & Winchester Mfg. Co.
South Wabash Engrg. Co.
Valley Iron Works Co.
Waldron Corp., John

SMOKE STACKS
The Biggs Boiler Works Co.

SOLENOID VALVES
Steamaire Company

WHERE TO BUY

SPRAYING EQUIPMENT
The Spray Engineering Co.
Sweetaire Company
STAINLESS STEEL
Anti-Corrosive Metal Products Co., Inc.
STARCH
Amer. Cyanamid & Chemical Corp.
Clinton Industries, Inc.
National Starch Products, Inc.
Stein, Hall & Co., Inc.
STATIC ELIMINATORS
Sweetaire Company
STEAM SPECIALTIES
Babcock & Wilcox Co.
Cochrane Corp.
Johnson Corp.
Perfecting Service Company
Shartle Bros. Mch. Co.
Stickle Steam Specialties Co.
STEEL TANKS
The Bigge Boiler Wks. Co.
STRAPPING & STRAPPING MACHINES
Acme Steel Company
The Stanley Works
STUFF CHESTS
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Valley Iron Works Co.
SUCTION BOXES
Black-Clawson Company
A. E. Broughton & Co.
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Westinghouse Electric Corp.
SULPHUR
Amer. Cyanamid & Chemical Corp.
Stauffer Chemical Company
Texas Gulf Sulphur Co.
Witco Chemical Company
SULPHUR BURNERS
Valley Iron Works Co.
SULPHUR DIOXIDE
Ansul Chemical Company
SUPERCALENDERS
B. F. Perkins & Son, Inc.
TALC
Amer. Cyanamid & Chemical Corp.
W. H. Loomis Talc Corp.
TANKS
Cochrane Corp.
E. D. Jones & Sons Co.
Kalamazoo Tank & Silo Co.
The Noble & Wood Machine Co.
Raybestos-Manhattan Inc.
Manhattan Rubber Division
Rodney Hunt
I. O. Ross Engrg. Corp.
Shartle Brothers Machine Co.
Stowe-Woodward, Inc.
United States Rubber Co.
Waldron Corp., John
B. F. Perkins & Son, Inc.
Testing Machines, Inc.
THICKENERS, DECKERS AND SAVEALLS
Bird Machine Company
Bulkley, Dunton Pulp Co., Inc.
Carthage Machine Co.
Dilts Machine Works
Dorr Co.
Downingtown Mfg. Co.
Hardinge Co., Inc.
Montague Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Valley Iron Works Co.
TITANIUM
E. I. du Pont de Nemours & Co.
Titanium Pigment Co.
R. T. Vanderbilt Co.
Witco Chemical Company
TOOLS
Acme Steel Company
Ingersoll-Rand Co.
The Stanley Works
Walworth Company
TRUCKS
Autocaatic Transportation Co.
TRAPS
Armstrong Machine Works
Cochrane Corp.
Crane Co.
Grinnell Company.
Johnson Corporation
Shartle Bros. Mch. Co.
Stickle Steam Specialties Co.
TUBS
Rodney Hunt Machine Co.
Noble & Wood Machine Co.
Shartle Brothers
Valley Iron Works Co.
TURBINES
Allis-Chalmers Mfg. Co.
De Laval Steam Turbine Co.
General Electric Company
Hunt, Rodney, Mach. Co.
Westinghouse Electric Corp.
Worthington Pump & Machy. Corp.
TURPENTINE RECOVERY
Foster Wheeler Corp.
USED EQUIPMENT
Frank H. Davis Company
Gibbs-Brower Co.
Thomas W. Hall Co.
Noble & Wood Machine Co.
Rotogravure Engrg. Co.
J. J. Ross Company
Ross Paper Machy. Co.
Ross Paper Machinery Co.
Shartle Brothers Machine Co.
VALVES
The Bristol Company
Cochrane Corp.
Crane Company
Dilts Machine Works
Fibre Making Processes, Inc.
The Foxboro Company
E. D. Jones & Sons Co.
Magnus Metal Corp.
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
The Permutit Company
William Powell Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Stickle Steam Specialties Co.
Taylor Instrument Companies
Valley Iron Works Co.
Walworth Company
VALVES, LUBRICATED PLUG
American Car & Foundry Co.
VATS & VAT PARTS
Union Machine Co.
Union Screen Plate Co.
WASHERS
Bird Machine Company
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Wks.
Rodney Hunt Machine Co.
Shartle Brothers Machine Co.
Valley Iron Works Co.
WATER CONDITIONING
Cochrane Corp.
The Permutit Company
WATER DISPERSIONS
American Anode, Inc.
WAXING MACHINERY
Black-Clawson Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co.
Waldron Corp., John
Weber, Herman G.
WELDING EQUIPMENT
Allis-Chalmers Mfg. Co.
General Electric Company
Walworth Company
Westinghouse Electric Corp.
WET MACHINES
Black-Clawson Co.
Carthage Machine Co.
Downingtown Mfg. Co.
Moore & White Co.
Montague Machine Co.
Noble & Wood Machine Co.
Pusey & Jones Corp.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
WINDERS AND REWINDERS
Black-Clawson Company
Cameron Machine Co.
Dietz Machine Works
Downingtown Mfg. Co.
Thomas W. Hall Co.
Hudson-Sharp Mach. Co.
Langston Co., Samuel M.
The Kohler System Company
Montague Machine Co.
Moore & White Co.
Paper Converting Mch. Co.
Potdevin Machine Co.
Pusey & Jones Corp.
Rotogravure Engrg. Co.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Smith & Winchester Mfg. Co.
South Wabash Engrg. Co.
Waldron Corp., John
WIRES
Appleton Wire Works
Black-Clawson Company
Bulkley, Dunton Pulp Co., Inc.
Cheney Bigelow Wire Works
Hayden Wire Works
International Wire Works
Lindsay Wire Weaving Co.
Shartle Brothers Machine Co.
WOOD PEELERS
Nekoosa Fdy. & Mch. Wks., Inc.
WOOD SPLITTERS
Carthage Machine Co.



PAPER TESTERS

Fully Automatic Schopper Riegler Type Freeness Tester

Eliminates Human Error

SCHOPPER TYPE
TENSILE
FREENESS
FOLDING

CANADIAN STANDARD FREENESS

DEAD WEIGHT MICROMETERS
BASIS WEIGHT SCALES
NEWS PENETRATION
POCKET SCALES MICROMETERS
HINDE & DAUCH CRUSH
TEAR-BURST-STIFFNESS

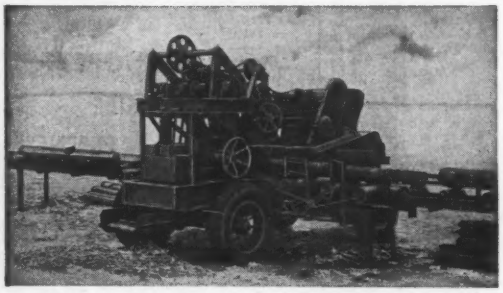
TESTING MACHINES Inc.
429 W. 42nd St., New York 18, N. Y.
Old inaccurate Scales, Micrometers and other testers recalibrated and made over like new.

PRICE & PIERCE, Ltd.

WOOD PULP & PAPER AGENTS
for domestic and export

60 EAST 42nd STREET
New York 17, N.Y.

NEKOOSA PORTABLE WOOD PEELER



ADAPTABLE TO A VARIETY OF OPERATING CONDITIONS

Savings

If wood is peeled in the woods freight on bark is eliminated, less weight per cord of wood is shipped thus reducing freight. Shrinkage per cord is reduced. Wood can be peeled mechanically at less cost than the differential between peeled and rough wood.

Large Capacity
Low Cost Operation
No Wood Loss

manufactured by

Nekoosa Foundry & Machine Works Inc.

Nekoosa, Wis. U. S. A.

ALPHABETICAL INDEX TO ADVERTISERS IN THIS ISSUE

A

Allis-Chalmers Mfg. Co. 3
American Colloid Co. 57
Appleton Wire Works, Inc. .. 57
Appleton Woolen Mills 57

B

Becco Sales Corp. 17
Bedford Development Co. 59
Binney & Smith Co. 61
Black-Clawson Co. 51
Bloomfield Woolen Co. 56
Broughton, A. E., & Co. 27
Buffalo Pumps, Inc. ...|..... 4

C

Cameron Machine Co. 49
Classified Advertising 50
Columbian Carbon Co. 61

D

Davis, Frank H., Co. 54
DeLaval Steam Turbine Co. ... 57
Dilts Machine Works 51
Downingtown Mfg. Co. 2

F

Ferguson, Hardy S., & Co. 49

G

Geigy Company .....Front Cover
Gibbs-Brower Co., Inc. 54

H

Hall, Thomas W., Company... 54
Hamblet Machine Co. 60
Hardy, George F. 49
Harrington & King Perf. Co. .. 49
Hendrick Mfg. Co. 60
Hercules Powder Co. .....13 & 14

I

International Nickel Co. 32
International Wire Works 57
Int. Exposition Co. 65

J

Johns Manville Corp. 25

K

Kinsley Chemical Co. 57

L

Langston Co., Samuel M. ....9 & 49
Lyddon & Company 31

M

Main, Inc., Charles T. 49
Mayer Machine Co. 57
Merritt-Chapman & Scott Corp. 49
Michigan Steel Casting Co. 57
Monsanto Chemical Co. 15
Moore & White Co. 57

N

Nash Engrg. Company 58
Nekoosa Fdy. & Mch. Co..... 64
Niagara Alkali Co. 19

P

Parsons & Whittemore, Inc. ... 31
Pennotex Oil Corp. 49
Pittsburgh Corning Corp. 11
Potdevin Machine Co. 58
Price & Pierce, Ltd. 63

R

Raymond Service, Charles P. . 50
Ross Paper Machy. Co. 53
Ross, J. J. Company 52

S

Shartle Bros. Machine Co. 51
Smith & Winchester Mfg. Co... 49
Spray Engrg. Co. 5

T

Taylor-Stiles & Co. 57
Testing Machines Inc. 63
Tidewater Assoc. Oil Co. 57
Titanium Pigment Co. 23

U

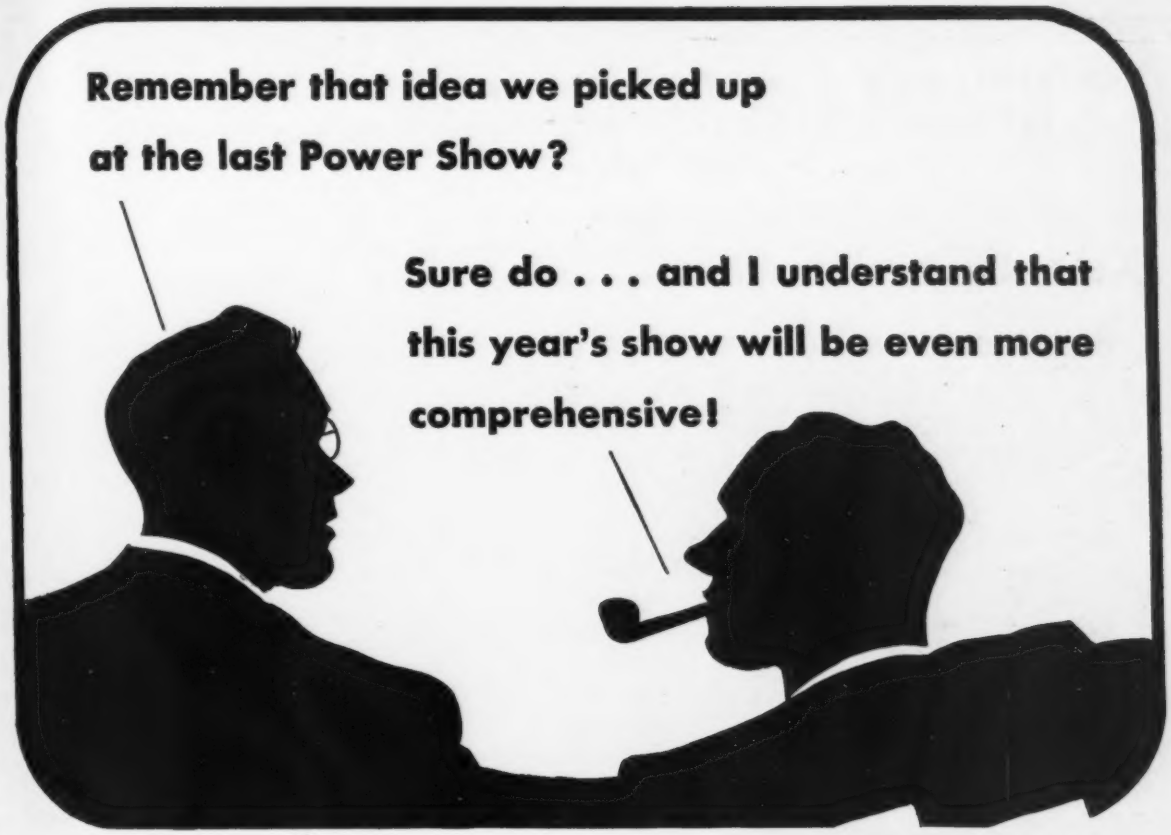
Union Screen Plate Co. ..Back Cover

V

Vanderbilt, R. T., Co. 6

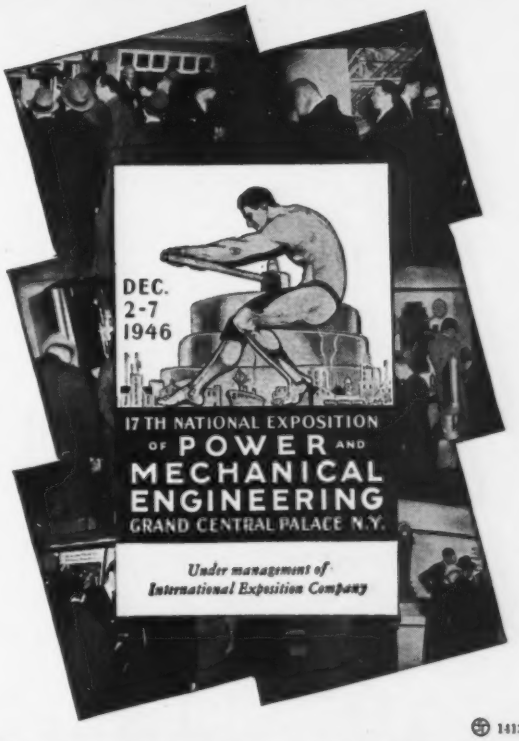
W

Waterbury Felt Co. 49
Weber & Co., H. G. 62
West Va. Pulp & Paper Co. ... 62


Remember that idea we picked up at the last Power Show?
Sure do . . . and I understand that this year's show will be even more comprehensive!

IDEAS? Yes, there will be plenty of them in the 350 exhibits at the 1946 Power Show. Production ideas . . . maintenance ideas . . . *money-saving* ideas. Come and see what the nation's leading suppliers of power equipment are doing and thinking about. Talk to specialists at the informative exhibits.

The Power Show is for *power men.* General public not admitted. Admission by registration. Reserve the date. Be there with your associates.

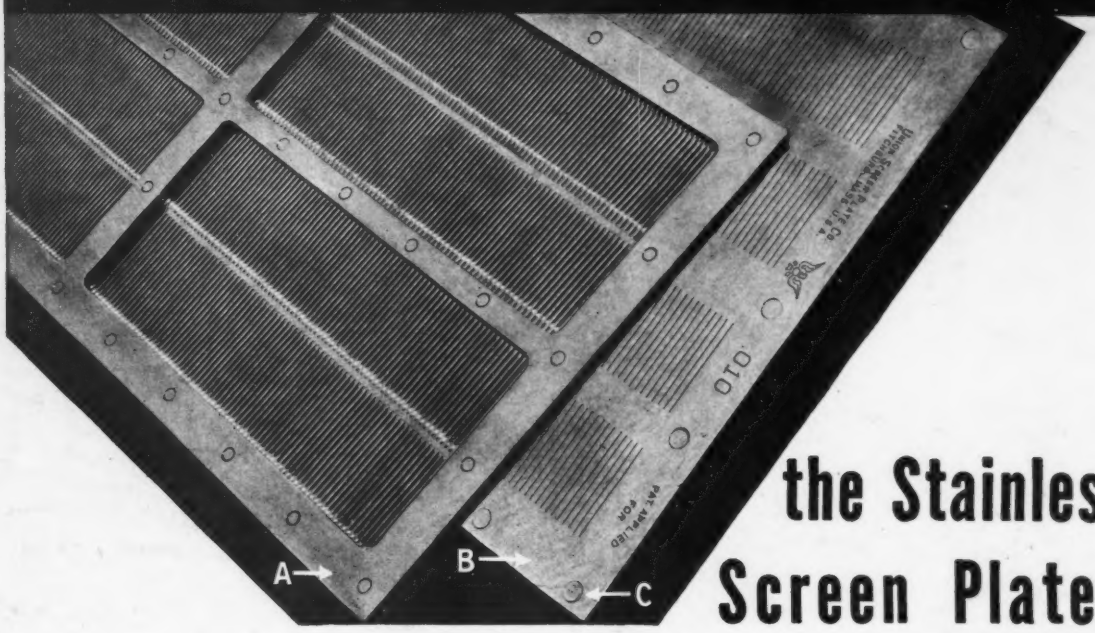


1413

17th NATIONAL POWER SHOW

GRAND CENTRAL PALACE, NEW YORK • DEC. 2-7, 1946

* CORROSIST



the Stainless Screen Plate ·

Here is the Screen Plate you have been waiting for. Rugged enough to withstand normal use without breakage. No rebuilding of your present screens. No "babying" to get full capacity. Standard dimensions. Unlimited life. Made entirely of stainless, corrosion-resisting metals. Proven by 8 years of service in Canadian Pulp and Paper Mills.

CONSTRUCTION: (See photo)

A. FRAME—Butt-welded Monel bars form an amazingly stiff back-bone, reduce flexing.

B. PLATE—1/8" Stainless steel, milled and sawed. Slot "breathing" held to the minimum.

C. RIVETS—Inconel for toughness, set home under 5 tons pressure per rivet.

STANDARDS:

CUT: 4 to 8 slots per inch, .008" and larger.

STYLE: C and E only, drilled or Witham bevelled.

THICKNESS: 3/8" only.

SIZE: 12" x 43" standard. 42" length on special order.

DELIVERY:

Production will start in October. Orders are being accepted now.

* Trade Mark

UNION SCREEN PLATE COMPANY
FITCHBURG, MASSACHUSETTS